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EDITORIAL

WE HAVE A FRIEND, a professor in a European university, who has never been able to afford the luxury of travel except, oddly enough, for a walking tour in the British Isles that included a week in Skye. To compensate for this great lack in his life, he has a lively imagination which allows him to travel in spirit from a bench in the Gare Montparnasse. To be frank, we are not sure of the station but Montparnasse is, itself, a stirring word, and will do. In Paris, the trains are named by their destination and the names were enough to send him off with all the enthusiasm of Marco Polo to Samarkand, Istanbul, Moscow or Ur. All of which is quite irrelevant except that since we were a small boy, we have wanted to see Petra, Kalimpong and the Rockies. Two of those have yet to be realized, but such are the inscrutable workings of Providence that this year, we shall see the Rockies twice.

We have just returned from Banff where we attended Session '56 under the auspices of the Alberta Association. Mr Peter Oberlander has described the meeting admirably elsewhere in these pages, but a whole issue of the *Journal* would hardly do it justice. The memories that one has of Session '56 are the place itself which is unforgettable, the very great sincerity of those taking part, the unostentatious hospitality of our hosts the Alberta Association, and the presence of Mr and Mrs Neutra. Less important, but part of the atmosphere of the occasion was the continual removal of hats, coats and rubbers as we entered three different buildings a dozen times a day for food, discussion or rest. Some will remember the hot pool where we bathed outside, and our hair froze at 24° below while others, a reckless few, cooled their fevered brows by 4 a.m. tobogganing down a minor mountain side on flattened cardboard containers.

The balance of work and play was so happily arranged that it was often hard to tell where one stopped and the other started. As a regular thing, we had a seminar in the morning and one in the afternoon. More often than not, the evening began with an informal lecture with slides followed by a session of song with such virtuosi as Messrs Bouey and Berwick at the piano. On a distinctly higher level, if the virtuosi will allow us to say so, was the evening when Mrs Neutra sang German, Italian and French songs and accompanied herself on the cello. As Professor Burgess said, as we left the room. "That was one of those occasions when one's feelings are too deep to be expressed in words". We would all agree, we think, that Mrs Neutra and Professor Burgess contributed even by their presence not a little to the sincerity and the sense of purpose that marked all sessions.

In saying so, we do not forget the high priest himself, Mr Neutra who led all the discussions and set the intellectual pace. The word 'dedicate' is not one we would use without thought, but it is one we would use without hesitation in regard to Mr Neutra and his search for architectural truth. Quite often the truth was not apparent even to him, and the search for it involved a strain that we, in the audience, could not share. We are deeply grateful to him and trust he is none the worse for the ordeal.

The future depends very much on the willingness of the Alberta Association to undertake as individuals the elaborate organization necessary for such a conference. All who attended '56 agreed that the search for truth must go on if at all possible. Not the least of the difficulties for next year will be that of holding the number attending down to forty. Seats in the Abbey at the Coronation look easy to get by comparison – except that many of us who went to Banff this year will feel obliged to give our seats to others.

Mathematics in Architecture

Irving Grossman

MY SUBJECT, MATHEMATICS IN ARCHITECTURE has always interested me greatly. It was not, however, until I started working on this paper, that I began to realize its full importance, and the extent of its influence. For the world of mathematics is an elemental world; the forces in it are powerful – its horizon limitless. This world touches every aspect of human activity, and enters into every part of life about us. From the definition alone, we begin to see why: 'Mathematics is the science that treats of measurement, properties, and the relation of quantities.' So whenever you ask the questions 'how much – or in what proportions, or in what relations to other things,' – you are dealing with mathematics. And these questions, it is easy to see, can be asked with reference to everything we do, or observe.

Therefore, in making any kind of study of mathematics, even of a general nature, we soon find ourselves involved with science, with pure logic and philosophy, with religion, and with all the arts. In fact, whenever man tries to examine the world, understand it, impose a little order on it, or express his feelings about it, mathematics enters the picture.

Now architecture, as we know, also touches upon a great many facets of human life and organization; throughout history, it has reflected these, as well as man's general attitude towards the world; an attitude which we have to understand before we can pass intelligent judgments on its nature. Consequently, when we combine these subjects, mathematics and architecture, for the purpose of this talk, we bring together two of the most basic of human activities, about which the great thinkers of all ages have had much to say. This, then is by no means a simple subject, that can be presented in an entirely factual way. Much of history has to be interpreted, and in my studies for this, I have more than once encountered theories entirely opposed to one another. However, I did notice one thing quite clearly; and that was the consistency with which certain similar ideas concerning mathematics in architecture appeared in different periods of history; a kind of thread that seemed to link these periods together. This seemed to bear out only more strongly the elemental nature of the subject.

At first glance, it probably appears that measure, property, and the relation of quantities refer only to the physical aspect of architecture – the actual stuff out of which it is made, and the means it is measured and assembled. But we know that there is more to it than that; and just as there is in architecture, so is there in mathematics. For, while in the scientific sense, mathematics does deal with *quantitative* compositions, it is when *qualitative* results are recognized, that we come face to face with its philosophical content. Here, immediately, such phenomena as good proportions, harmony, symbolism, and beauty find their place, and it is precisely here that mathematics and architecture find that common ground which raises them both above the level of pure practicality.

The crux of my paper is this: Architectural form, like all man-made form, is charged with meaning, although it can assume certain significance in its own right.

It is known that every age attributes its own meaning to forms to those created in its own time, as well as to those that exist from earlier ages. Thus what we feel about certain architecture of the past, can very often be different from what the people creating it at the time felt. We study history in order to find out just what these original attitudes were.

Now I think we will agree that mathematics, being intimately tied with the architectural process, could in its qualitative sense be an important influence in achieving meaningful form. History shows that it has, and moreover that in some periods it was *the* dominating influence. I should now like to enlarge on this, to show that the use of mathematics in architecture, and the other arts, came into being because of certain reasons, and led to certain results which were in keeping with the general spirit of the times, the 'zeitgeist', to use the broader German word. This equation of quantity with quality is the thread I mentioned, that winds through history; I hope to show in the end that this thread has continued right into our own times.

If we start by looking at our prehistoric ancestors, we will see most easily the relation between art forms and social patterns, for these patterns were relatively simple with primitive man. Actually, the more developed a culture is, the more such relationships become obscure and difficult to uncover. What concerns us most here is that in the transition from the Old Stone Age to the New, prehistoric man enacted the very first change of artistic style. That is, from the evidence we have, his art forms changed from a refined, fluid, naturalism, to a strongly styled geometrism. Why this happened at such an early stage in man's development is interesting. One theory, proposed by the historian Arnold Hauser, attributes this change to the new way of life that man had come to lead. Until about 5000 B.C. man was a roaming hunter, a nomad, who lived an independent life without any organized social system at all. He depended entirely on his hunting, and hence on his accurate sight and keen observation. His beliefs were based on the magical power of imagery; when he drew the well known bison drawings on his cave walls, these drawings became for him the bisons themselves; and when he drew men hunting and killing them, they were for him really dead. Thus, as far as he was concerned, the more vivid the realism, the more powerful the magic. Now, with the New Stone Age, the living habits of man changed drastically. He began to settle down, to cultivate the soil, create communities; he spent his time training animals, observing the changing seasons, establishing tribes and tribal customs, and in general imposing order on his environment, instead of allowing it to control him. And what do we find happening to his art forms; they now are geometrically directed, and not realistic at all. Man now turned from portraying concrete reality of experience, to the expression of concepts and ideas, concerning the inner nature of

things. Instead of reproducing, man indicated; and abstract geometrism became his mode of formalizing this urge . . . the first step towards hieroglyphics. Then man started to worship—animism entered his cosmology, and for this he created idols and symbols which embodied forces to which he attributed the weather, the fertility of the soil, and human destiny itself. As man became more interested in concepts, which might be termed order in the mind, he expressed this with geometrism, in abstract symbol, in pure pattern, which is visual order — man made. And man began to measure. In order to construct his first places of worship, his huts, his pallisades, man used as the unit that tool which he was least likely to loose — his pace, his foot, his elbow, his finger. And in doing this, whether he realized it or not, he was regulating his buildings, and at the same time introducing the human scale, which no doubt pleased him in any case; for all was in harmony with him.

In deciding the shapes of his buildings, man resorted to the right angle, to squares and circles, and these he laid on axes. The explanations for this are still varied and conflicting: Some claim that geometry was his only means of asserting order, in a way that he could recognize it — others say primitive man never was aware that he was creating a circle, or a square, and that there was no geometry in his instinctive make-up at all. What I am concerned with is the fact that geometry did come into being, and together with man's first attempts to organize his existence. To me, geometry, man and order are thus brought together in a basic principle.

If we turn to Egypt now, we see the use of geometric forms developed into an actual vocabulary, which was used according to strict formulae and design codes. We know their temples, pyramids, palaces and tombs, and what strikes one seeing these is how out of the use of the simplest of cubic forms, such magnificent architecture results which emits an unmistakable aura of calm serenity, and leaves no doubt in the observer that it intends to exist as long as time itself exists. That this was the desired effect is clear from our knowledge of the Egyptians. We know that stability and eternal endurance was the most important part of their whole cosmology; that the cult of the dead overshadowed everything they did or thought. Change was feared. And everything that added to the feeling of balance, order, and tranquility was sought for in their architecture. Why this was so, is again the subject of much speculation.

One theory stresses the physical landscape in which they lived. Egypt is flat, and completely uniform, and down its centre flows the life giving Nile. On either side, in perfect symmetry about this axis, are the banks, and the ranges of mountains, exactly mirroring one another. Nothing else exists to create any violent contrasts. All is even, and unchanging. Such a setting, it is claimed, presented to the Egyptians every day, year in year out, for 3000 years, had ample time to make its full impression on them. And it is to this setting that their strong sense of symmetry and balance so evident in their architecture, is attributed. This same balance is reflected in their literature, with its mirrored rhythms, and also in their self-created supernatural world, where every event, or personality had its counterpart, with some central feature acting as axis. From inscriptions, we read the artists themselves speaking of their work in terms of proportion, balance, and poise of motion.

Now where did mathematics fit into the picture? From measurements of the buildings, we find a gamut of mathematical ratios and proportions, that primitive man could not have conceived of. Throughout the pyramids, the tombs, the furniture, and the decorations, are to be found regulating proportions like the Golden Section, and variations on it, the square, the double square, right angled triangles which apparently were sacred to them, and even strict modules, to which the great pyramids were designed. Much of this was used in places never to be seen by human eyes, which suggests that their importance lay in how they pleased the very gods themselves. Here, to me, is the epitomy of geometrism, precisely expressed, in the most elemental forms, and abundant with calculated mathematical proportions. And we see how the whole is subservient to, and reflects the religious and political forces of its time, as well as the natural setting around it. But the concept of beauty in its absolute and universal sense, had not yet been born. This was for the remarkable Greeks to discover.

It seems that whenever you delve into any aspect of Western culture deeply enough, you sooner or later reach its roots in Greece of about the 6th Century before Christ. And in the field of architecture as 'the pure creation of the mind' many feel we have yet to surpass them. The West has always been in awe of the ancient Greeks. They were the first curious people; that is, the first to feel the natural desire to *understand* the facts of experience, and to search for the underlying principles that activated these, so that they could be abstracted, and generalized from the particular.

It was Pythagorus who first realized the principle of generalization, which is the basic property of mathematics; and the first to use his power of reason, divorced from superstitions and restricting dogmas, to construct a system which would represent the universe as he believed it to be. In this system he laid great emphasis on the importance of number. 'Everything is arranged according to number,' he said. But these were not just ordinary units of measure according to him; they were classified, and given what could be called personalities. The number five for example, was the number of love — uniting the first even female number, two, with the first odd male number three. It was also the number symbolizing health, and harmony, and was incorporated in the goemetric symbol, the pentagram which became the secret symbol of the Pythagorean Brotherhood. Its construction and proof was of the highest secrecy, and many important men were expelled from the society because they had divulged these secrets. Again the dodecahedron symbolized the universe in its entirety, and was later used by Plato.

A whole mysticism of numbers grew up. The Society of Numbers was formed in Alexandria, which had its offspring in far-off parts of the world, and held its influence for many years —the Hebrew Kabbalists, the mediaeval magicians, the masonic lodges, and the Rosicrucian Societies all absorbed this mysterious force of numbers.

Plato is responsible for interpreting the mystical divinations of Pythagorus in a clear and understandable way. He enlarged on his theory of numbers, and eventually produced his own Platonic Five Solids, with which he believed everything in the universe could ultimately be identified. These have come up again and again in scientific studies of later periods. In his system, the world was the theatre in which ideas were realized. The act of such realization was not knowledge alone, but closely resembled a pleasure of the soul, which Eros, or love, inhabited; and in the idea of excellence, he placed beauty as the result of the proper disposition of harmonious components of a thing. *The concept of harmony then, is the result of mathematical relations of numerical measurements, which leads to beauty.* The joy of the mind, fusing with the sublime emotion of love, in the appreciation of things beautiful; a new and rare sensation for man to recognize, and an ideal to be sought after in everything he did. The universality of this law was further manifest to Plato by the observable fact that the most beautiful sounds plucked on the strings of the lyre, came from those strings whose lengths were in certain proportions one to another; and in these proportions which he measured, he saw the music of the spheres being translated into visible mathematics. In science, the relation of quality to numerical quantity was also observed; Democritus for example, in his atom theory attributed qualities to the elements, which depended on the geometrical arrangements of the particles it consisted of — an idea not far off from our own of today. This same spirit of mathematical curiosity and the desire for ideal perfection infected Greek architecture.

When we look at the Parthenon, there is no denying that the emotions are affected. An intellectual analysis of this temple

reveals a complex system of mathematical harmonies, which governs the relationships of all its components, making them sing this same music of the spheres. And so with almost all Greek architecture — truly of the highest order, combining emotions with intellectual control, delicacy with virile strength, pure forms with fluid sculpture. The Egyptians, shrouded by their dogmas would never have appreciated this. It was not part of their life.

With this intellectual grasp of the mathematical content of beauty, the Greeks asserted their genius in a new way as well. If we carefully check measurements, we see slight 'discords' that have been introduced as correctives. Entasis for example in the columns, a slight swelling in the centre, to make them appear pure cylinders, although they are not; the rising curves of the horizontal members, to make them appear horizontal, although they are not; the varied spacing of the columns, to make them appear equally spaced, and solid, and so on. In this, the Greeks showed their dominating artistic sense, which, although disciplined by mathematics, was not controlled by it; in this, they recognized that the creative impulse was still the primal force, and everything else was a refinement. And this principle is basic to any understanding of mathematics in art. When we come to present day conditions, this same principle governs.

The Romans, as great engineers, made full use of mathematics as a practical science. In their capacity as rulers, and administrators, they had to deal with problems concerning great numbers of peoples, and the organization of these in their buildings. Their large scale city layouts, and highway systems, reveal strict rectalinear controls, which remind us of our own cities of today. They developed new ways of spanning space out of which evolved new forms — the arch, the vault, and the cupola. Their architecture was gigantic in scale, pompous and impressive, and highly efficient at the same time.

Vitruvius was the first to lay down clearly the principles of architecture. He discussed symmetria, which the Greeks had known, and proportion, order and harmony. In his definition of architecture, Order is first and foremost — 'the balanced adjustment of the details of the work, separately, and as to the whole, the arrangement of the proportion with a view to a symmetrical result.' He goes on to refer to modules which should be taken from the various parts of a building, and used throughout it. In his third book, on Temples, he introduces the human scale, which has been the source of reference on this subject right to our own day. He says 'without symmetry and proportion, no temple can have a regular plan; that is, it must have an exact proportion worked out after the fashion of the finely shaped human body. For nature has so planned the human body, that from the chin to the top of the forehead and the roots of the hair is a tenth part; also the palm of the hand, from the wrist to the top of the middle finger is as much . . .' and so on. Vitruvius completely analyses the human body, showing how all its proportions are related; and then expresses the wonder of it, when he shows how it can be drawn within the confines of the two most pure shapes, the circle and the square. This to him is significant, revealing an essential relationship between man, and the perfection of geometry which should be instilled of all places in the temple.

When we pass into the Middle Ages, mathematics is used in architecture to further symbolize this relation of man to the world — which is God. As a pure science, mathematics was more or less neglected by the West during the Middle Ages, the initiative being taken up by the East. During this period, the West dedicated all its energies to the religious urge, the spiritual attitude towards life, and after life; and mathematics was used to further these aspirations. Although the technical problems of enclosing space were, as in Roman times, responsible for the development of new geometric forms, the Gothic builders were interested in imbuing these forms with greater significance than just the practical considerations. They had inherited the mystic attitude towards number from the Pythagoreans, which had been transmitted by various sects and orders through the ages. They maintained these attitudes most strictly in their own Masonic Lodges, donating great importance, for example, to the pentagram and the decagram, Pythagorus' most treasured and mystical geometric shapes.

The basic plans of all Gothic churches were based on secret Key diagrams. These were handed down from Master to Master, as part of an initiation ceremony, at which the mason was given his own personal seal, which remained his password. Whenever he travelled to other Lodges, he was obliged to give a geometric proof of his seal whenever asked; that is, to develop its full shape, showing how it was formed.

It was during the 19th Century that most of the study on this subject was made. This was the result of a general desire to know whether the proportions in historical buildings were the result of accidental good taste, or whether their builders had followed explicit rules and canons of proportion and design. Many theories were evolved, which proved some buildings but not others!

One Viennese architect analyzed some nine thousand seals, from all over Europe, discovering the keys to them all — the proofs. From one such key diagram, apparently all standard Gothic plans can be derived. A Munich architect, Moessel, spent years in measuring all the Egyptian, Greek, Romanesque and Gothic buildings of which there were plans available, and finally arrived at a theory that embraced all the others. After checking lengths, surfaces, and volumes, he classified all the thousands of dimensions and observed certain ones to be more important than others, and recurring throughout the various buildings. His belief was that all the geometrical shapes could be reduced both in plan, elevation, and section, to the inscription within the circle, or several circles, or one of several polygons. This "circle of orientation", as he called it, was actually traced on the ground, before a building was started, as a guide to its construction. Its geometric shape was chosen to be in agreement with the religious importance of the building. This shape was arrived at by dividing the circle into several parts, generally five or ten; this immediately introduced the golden section theme, which is inherent in such divisions. And this theme was carried through the various elements of the building as a kind of leitmotif.

Looking at the Gothic church again, the circle, according to this theory, dominates the whole; and the golden section, being a proportion that cannot be clearly measured by the eye, as can a square, or a double square, can be said to reflect the Gothic builders' desire to suggest only the vague, unapproachable divinity above. The accent in the Gothic church is towards the infinite, and though the proportions used are full of complex harmonies, these are intentionally made unappreciable to the human eye; they are a truth of a final nature, almost supernatural; the same mystery is found in the complexity of the Gothic structures, which soaring into the heights, thrusting here and there, cannot be seen to end anywhere, and support things we cannot quite be sure of; ethereal, and spiritual, but never precise and formally intelligible as were the Greek and Roman buildings. This is the great difference — Le Corbusier, in one of his books, claims the Gothic churches are not beautiful. He says they are dramatic — a mysterious expression of spiritual and physical forces in play, in tension and release, and so on. But as to beauty — this belongs to the architecture of pure form, the cylinders and domes, etc. This is the classical approach to beauty.

With the Renaissance, as man's whole attitude toward God and the world underwent a great change, so the place of mathematics in his world altered too. Until quite recently, it has been believed by many that the architecture of the Renaissance was one dedicated only to the pursuit of pure form and beauty; that this architecture, as Ruskin put it, 'was pagan in origin, proud and unholy in its revival, and paralyzed in its old age . . . in which intellect was idle, invention impossible . . . ' or again as Geoffrey Scott described it, 'an architecture of taste, seeking no logic, consistency, or justification beyond that of giving pleasure.'

The historian Rudolph Wittkower whom I have had the pleasure of hearing lecture in London, rejects these theories quite soundly in his excellent book, "Architectural Principles in the Age of Humanism". He believes that there is sufficient evidence from the writings of the time, and from the buildings themselves, to prove that this architecture, like all great styles of the past, was based on definite values, that stemmed from strong religious beliefs; and that the symbolism in it, for which mathematics and geometry was used, gave it far more significance than pure forms alone could give it. The preoccupation of the architects with beauty and harmony, as realized through mathematics was not purely aesthetic reasons alone. Mathematics for them was actually, as Wittkower says, "a vehicle for penetrating to the knowledge of God, who must be envisaged through the mathematical symbol."

Alberti, was the first Renaissance architect to write a treatise on architecture. In it he sets out the full programme for the ideal church, and right at the start begins by praising the circle as the most important shape to be considered, pointing to nature where it was so often seen. He lists other geometric shapes, such as the square, hexagon, octagon and so on, and explains how these can be derived from the circle. Moessel's theory seems to be quite accurate. Alberti then sets out the rules of proportion that had to be followed, in determining heights of rooms, widths of naves, sizes of apses, side aisles and all the other parts of the church. And then he explains the reasons for this: The church should be the noblest ornament of a city, and its beauty should surpass imagination. It is this staggering beauty which awakens the sublime sensations, and arouses piety in the people. It has a purifying effect and produces the state of innocence which is pleasing to God. And this beauty, he goes on to say, consists of a rational integration of the proportions of all the parts of the building, in such a way that every part has its absolutely fixed size and shape, and nothing could be added or taken away without destroying the harmony of the whole. Only when these conditions were fulfilled, could divinity reveal itself. All was to be a geometric-equilibrium, similar to that of the human body; this was the true Vitruvian tradition being followed.

Now Alberti realized that the eye could not always take in these proportions at once, especially if it was moving through the church. Unlike the Gothic builders, who wanted mysterious quality to haunt the viewers, he felt that its presence represented the absolute values which our mere subjective perceptions need not necessarily be aware of. But they had to be there all the same. The essence then of the Renaissance church is then to symbolize the Christ that was infinitely good, and perfect, and truth and harmony itself; and hence the perfect symbol the circle. From the Gothic church the symbolism points rather to the Christ who suffered on the cross, hence the Latin cross plan.

The continuation of Vitruvius' thinking is seen in the writings of Lucia Pacioli, the mathematician, and good friend of Leonardo daVinci. He said, "from the human body derive all the measures and their denominations, and in it are to be found all and every ratio and proportion by which God reveals the innermost secrets of Nature". The human figure circumscribed by a square and a circle became their symbol of the new men, in his relation to God and the world. It appeared in the sketchbooks of the artists and sculptors as well as in the scientists. Man was the image of God; in his proportions was the harmony of the Almighty . . . let us then mirror these in our temples!

Bramante followed this tradition to, and lead up to Palladio, the last of the great humanist architects. He was born in 1508 in Vicenza, where he was a stonemason for ten years. He was discovered by a brilliant writer and patron Trissino, and educated by him at his own academy, along with the other noblemen of the town. There he was taught to appreciate the arts, architecture, mathematics and music, as qualities of virtue — after the Roman idea of virtue. He studied Vitruvius in Rome, becoming the expert on him, and writing several guide books on his buildings. One of Palladio's friends, Daniele Barbaro, who really was the embodiment of the all-round man, poet, philosopher, scientist, mathematician, etc., wrote then, that the intellect was man's power of dealing with certain truth, while artistic creations dealt with the uncertain truths. The only way these could be combined in a great work, was to combine the two, and in mathematics, which was an activity of the intellect, he saw the answer. Hence those arts that dealt with number, and geometry were for him greater, and held the dignity of certain truth.

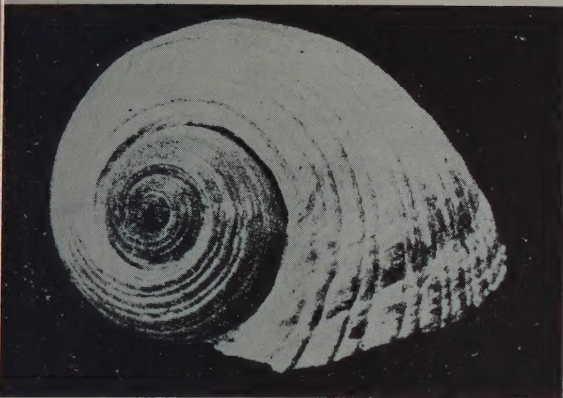
Surrounded by such men, Palladio absorbed much, and soon was trying to make his architecture the materialization in space of the certain truths of mathematics. And all the while he strove for clarity in plans, according to the ancient classical rules. He also loved the circle because it was to him, "simple, uniform, equal, strong and spacious". But Palladio went further than anyone had ever gone, in relating the whole volumes of his buildings to each other; he was interested in making all the rooms sing the harmonies of music, and he carefully determined their sizes, just like a composer at his time devised the scales, and created within these. He also borrowed a great deal from Plato's system of numbers, often using the number 27 as the largest multiple in a building of a module, which corresponded to Plato's containing number for the universe.

During the 17th and 18th Century, although the classical concepts of harmony were adhered to by such men as Galileo and Kepler, there began a movement against them. It sprang from the idea that proportions were not objective qualities that existed in the thing viewed, but were sensations experienced by the viewer. Hence, such considerations as his position at the time, his ability to perceive well, and his actual feelings at the time affected such appreciation of proportions. Names of Hogarth in England, and Hume, the philosopher come up here. And yet, from this period in history come the fantastic projects of Nicholas Ledoux in France — surrealist, worlds of pure form, spheres, wedges, ramps, the full range, absolutely stated, with no considerations of practical natures being shown. He also has been an influence on later architects.

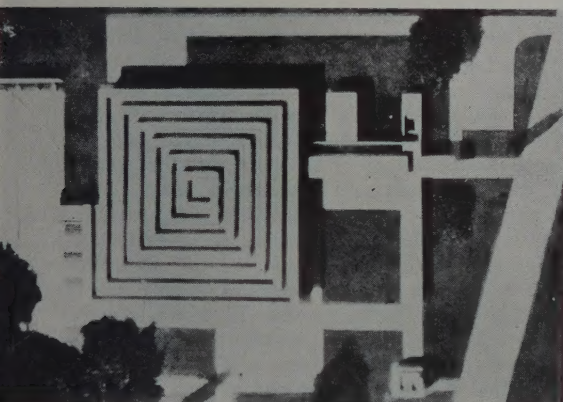
The 19th Century, with its industrial revolution, saw the escapism, in revivals, and lush sentimentality. And again, there were the exceptions that summed up the contents of the period, the Crystal Palace in England, and the Eiffel Tower afterwards in Paris. In the former was to be seen the mathematics of mass production and prefabrication . . . the endless adding of similar bays to each other . . . ending at exactly 1851 feet; the arbitrary number that coincides with the date of erection. This is a new force entirely opposed to the classical idea of a contained composition, which is later seen in the buildings of Mies Van der Rohe. Yet, in its honesty, this mathematics does reflect the pure technology of its day. The other arts too were being influenced by mathematics too now; notably in Seurat.

Which brings me to our own time. In retrospect, we have seen that the mathematics of geometry sprang generally from the technological and the artistic forces of its time. The former influence, which embraced such practical considerations as materials, methods and functions of buildings, produced geometric shapes to answer them. But, when the builders had some ideas and symbols that they were intent on instilling in their buildings, perhaps not even entirely consciously, they used this same geometry in the form of a language, which could be manipulated, to create certain visual effects, that often contradicted the practical considerations — the artistic urge was always the strongest. We also have seen that a certain repetition of geometrical shapes occurred in the various ages, although the whole spirit of the times was different; the same principles used for different ends.

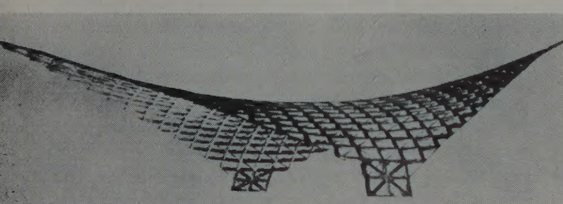
In our time there has been a resurgence of mathematical thought. This probably is due largely to the way scientists through mathematics have really upset our stable ideas concerning space and time, which we have held for so many years. In any case, from these new ideas, has emerged indirectly a new technology, which is now producing architectural forms



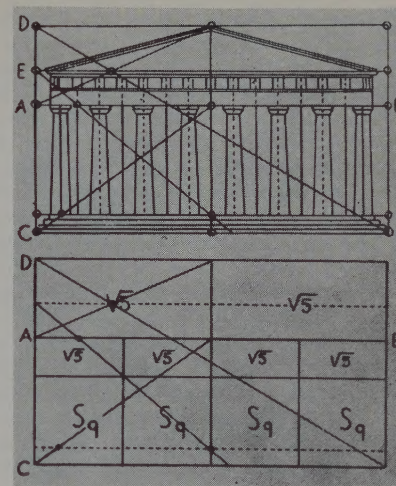
Geometry in nature



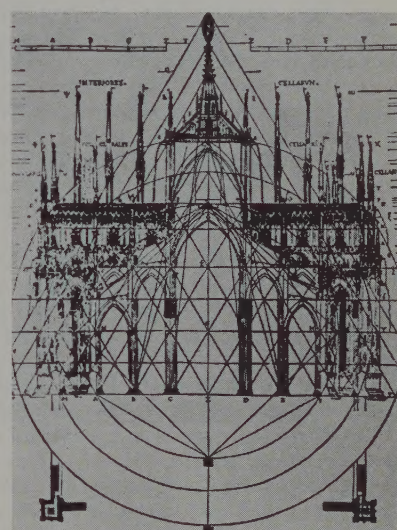
Man-made geometry
Le Corbusier's museum



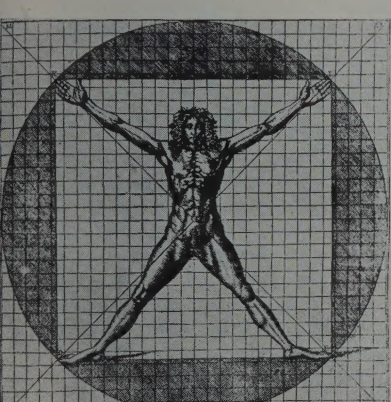
Mathematical calculations
resulting in direct
architectural forms



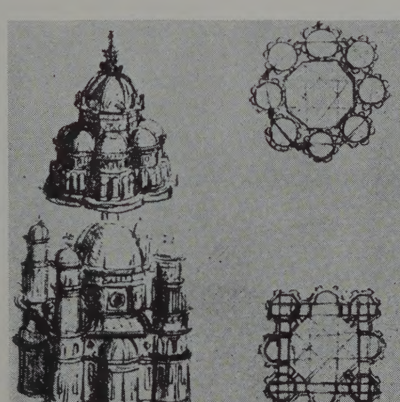
The Parthenon
A complex system of mathematical harmonies



The Gothic Church
dominated by the "circle of orientation"



Vitruvius expresses the wonder
of the human body and the
perfection of geometry.



Leonardo's sketches for churches.
Christ was infinitely good
and the circle was perfect.

entirely new to our eyes, just as the early grain stores came out of their technology as new forms. The principle of the distribution of forces along separate channels is being used now; by analysis, we discover where and what these forces are, and we separate them, so that we can deal with them individually with small structural members. This 'space framing', as it is called, is a very pure example of mathematical calculations resulting in direct architectural forms. These forms interestingly enough look much like the Platonic solids. We will no doubt become accustomed to them, and absorb them into our language together with the other more familiar ones. This is technique leading to form.

But mathematics in its qualitative sense is also interesting many people today, for various reasons. In 1951, at the ninth Trienalle in Milan, the first International Congress of the Divine Proportion took place . . . This was attended by scholars, mathematicians, architects, historians and artists from several continents. On display were the sketchbooks and documents of famous men in history who had studied mathematical disciplines in their work, artistic or scientific . . . starting in the 13th Century with Villard d'Honnecourt, the list included such men as Piero della Francesca, Alberti, Serlio, daVinci, Galileo, and Descartes. It ended with Le Corbusier.

And the golden section, or Divine Proportion was seen to be the common denominator of all these studies. In its many astonishing characteristics, this proportion seemed to be the symbol of man today, as a growing organism, that had to exist in healthy relationships with its neighbouring organisms, if it was to exist at all . . . and this could apply to any scale one liked. Siegfried Giedion believed that the great interest in proportion today mirrored a similar interest that of late had focussed on the relation of the individual to society; isolationism of the individual was almost impossible today . . . what was ideally sought for then had to be a happy equilibrium between the one and the many.

In psychology, physics, and literature too, this same interest was evident. We discover a personality not by a long description of it in a book, but rather by how he behaves in relation to other people and events . . . and what he thinks about these things. In town planning, as in industry the unit as fitting into the whole is important. The key word might be harmony; harmony in everything; which echoes our own namesake Vitruvius.

If we examine some of the properties of this proportion, the golden section, we may see why it was always considered so unique. It is drawn, by laying down on the side of a square, the diagonal of half the square. The new rectangle is a golden section rectangle, whose sides are in the ratio of 1:1.618. usually called ϕ. Now if you square this number algebraically, you get 2.618 or $\phi + 1$. If you cube it you get 4.236, or $\phi^2 + \phi$ and so on. This geometric series is unique in that any number in it equals the sum of the two previous numbers . . . *In other words the series is both geometric and additive at the same time*. From the drawing, too, we can see this property; if you add a square to the side of a ϕ rectangle, you get a larger rectangle exactly similar to the first, that is, a new ϕ rectangle. This principle of increase is called homothetic growth: for as the increase takes place, all surfaces and volumes at all times are similar, and the growth is made up of elements that came before . . . it is a logarithmic spiral of homothetic character. Now this principle is the foundation of natural growth, as found in botany, and biology, and that includes us. Many books have been written by un-artistic scientists, showing that this ϕ proportion governs much of the growth of sea life, plants, starfish, snowflake and the human body. Thousands of skeletons were measured to prove this. The important geometric figures in two and three dimensions exhibit this proportion; the pentagram, the decagram, the platonic solids, and so on, all used as key shapes by the past builders. And again those who attended Fuller's lecture a few years ago, heard the same shapes and proportions mentioned with respect to his geodesic structures.

The golden section proportion as an architectural discipline, has been used by Le Corbusier amongst others for many years. He also was interested in the pure geometric shapes, and the mathematical laws of growth, and he expressed these in his buildings. At the same time, architects and artists in general were showing this interest in cubic form, and simple masses, in directions of forces and simple geometric balances. Even Mies' buildings show this proportion, although he says very little about this. However, it might be interesting to note here, that the purely classical concept of form, as a contained, and completed composition doesn't apply entirely to Mies' buildings. It has been said, and I believe there is much in it, that his buildings have the mathematical quality of "endlessness"—that is, with no accents anywhere, no frames, and the repeated bays, all identical, these buildings could go on to any length, or be shortened by some bays, without serious effects to their visual aspect, — similar to the Crystal Palace in principle. Wright's work has this property too, flowing undefinedly into the confusion of nature, without any limiting discipline.

Whereas Le Corbusier in Poissy for example, gives us the perfect example of the contained composition completing the tradition of the Phidias, Vitruvius, Alberti, and Palladio.

Since the war, Le Corbusier has altered his approach to design quite markedly. His entire use of measure has been changed by his new invention the Modulor. He arrived at this new tool in somewhat the following manner: From biology we know the human body is related to the golden section principle of growth. Let us then apply a set of dimensions to the human body, which corresponds to its main members, and consequently which are in the golden section series. In order to get a larger range of numbers from our scale, we will set up two series, one the red, based on man's height of six feet, and the other, the blue, based on his height when his arm is stretched up. These two will be at the same multiples of one another. Now, if you choose any two numbers, or dimensions of the series, you will find that they are related to each other, they are related to the golden section, and they are related to the human body . . . to man. If you remember that every number on a ϕ series is additively as well as geometrically related to its neighbours, you can understand why Corbusier thinks these dimensions will be of great use in mass production processes, where fitting together of the parts will be inevitable, because of this principle. Now, if you choose two adjacent dimensions on the scale, they will obviously relate to each other by the ϕ. But if you choose two at distant positions from each other, the relationship, although it will exist, it has too, will hardly be appreciable to the human eye. Its absolute character is there, but one may not know it. Many of Corbusier's disciples feel that in this Corbusier has sacrificed a great deal. His earlier buildings, more pristine and simple gave great delight in their clear and readable proportions, whereas, in his Unité d'Habitation for example, it is not possible for one to lay on the ϕ rectangle over its length. The proportions are there, but not clearly perceivable. Nevertheless Corbusier feels that this new means of achieving harmony is the truest way — it is organic, uniting geometry with arithmetic, and all based on man . . . and at the same time is as free for the creative artist to use as is a musical system of notation, which in fact he hoped to parallel. The Modulor performs another important function also, in uniting the metric scale with the inch foot system of America.

Corbusier is also criticized by some for departing from his system, whenever it so pleases him. In this, I think he shows the same freedom that marks most creators; the ability to break their own rules, even though they made them, because they feel the urge to do so; this recalls the Greeks in their entasis, and even Palladio, who often introduced inexplicable dimensions into his otherwise perfect systems. This is the freedom that must characterize all mathematical disciplines. Mathematics cannot be a substitute for creation. But it can heighten the poetic effect, and instill a work with greater meaning. Mathematics is reason; and art rooted in the emotions, needs reason as a guide to make it communicative. Perhaps here lies the importance of mathematics in architecture.

Kiwanis Village 1954, Victoria, British Columbia

Architects, Charles E. Craig, partner in the firm of Sharp & Thompson, Berwick, Pratt and Charles E. Craig, Victoria

Landscape Architect, Wallace Ruff, Eugene, Oregon

Owners, Owned and administered by the Kiwanis Village Society, Victoria. Mr Edward Mallek, formerly of Victoria and now of Vancouver, has been the President and driving force behind this Society since its inception in 1952.

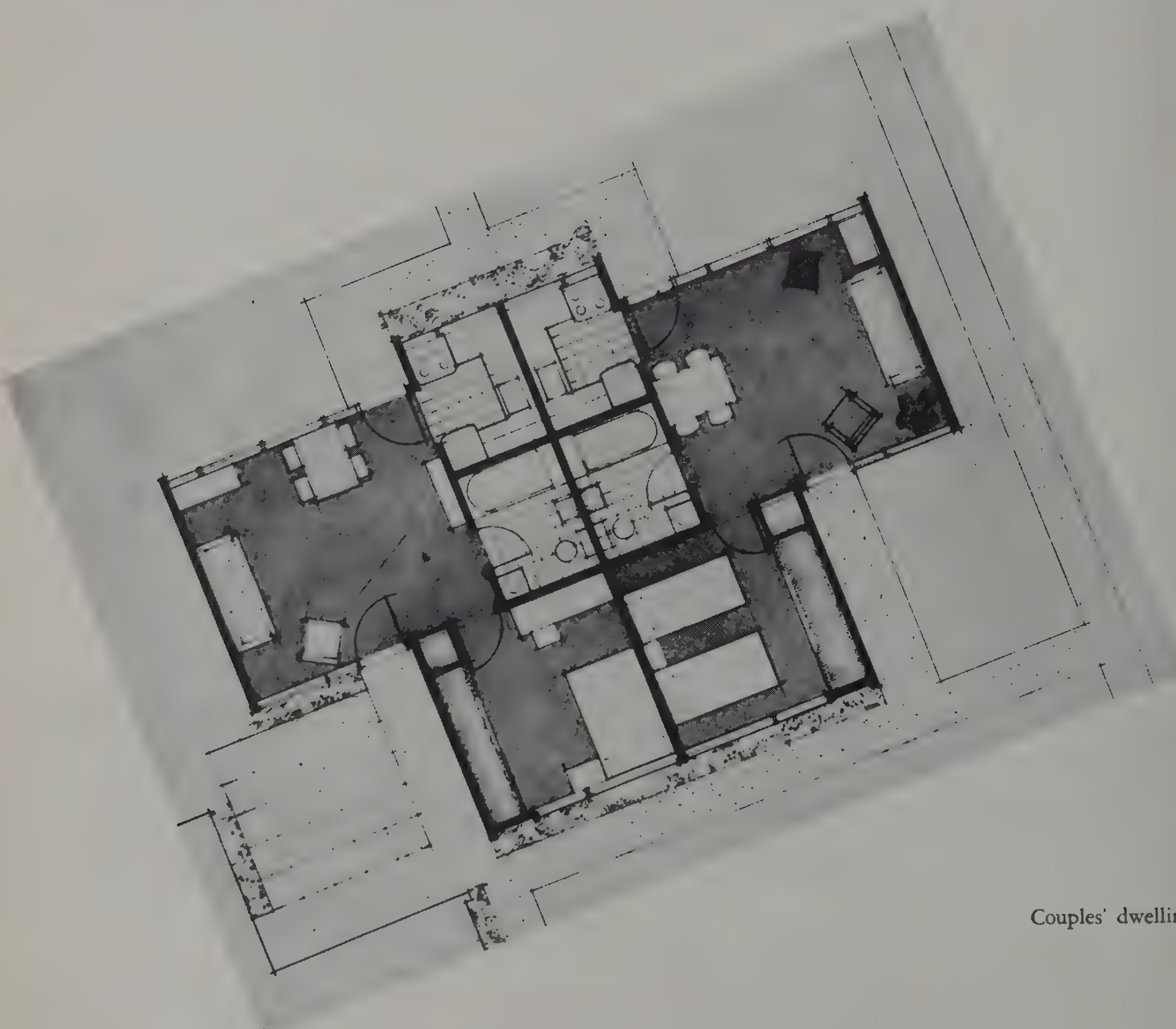
General Contractors, Luney Bros. & Hamilton and McKinty & Sons

Plot plan

View of open court from roadway

FAIRFIELD PHOTOS

Entrance to the Village



Couples' dwellings

Extent and Purpose of Project: Consists of 34 couples' units and 8 single person units, and provides low rental housing for deserving elderly couples on pensions and in case of the death of one, for survivors.

Rentals and Cost of Units: Rental per unit is $20/ month, and services including electric heating, electric range, hot water are fixed at $12/unit/month with adjustments at year end.

Total cost of completed Village was $290,000, of which the B.C. Government contributed $95,000, the City of Victoria, $5,000, public contributions $120,000, and the remainder of $70,000 was borrowed through CMHC.

Single person dwelling
4 dwellings per unit

FAIRFIELD PHOTOS

Living-dining area

FAIRFIELD PHOTOS

The kitchen

Design and Planning Considerations: Living room windows of all units face landscaped areas. None look into service or back yard areas. Ratio of building area to total ground area is one to six. Units grouped in varying floor elevations from 0' to 7' allowing views over flat roofs. Each unit has an allocated front garden and available vegetable garden area in rear service yards. Exterior ramps allow movement through entire area without using stairs, allowing free movement of wheel chair residents. Power and telephone services are underground to avoid any service poles. Entire area landscaped with provision for recreational areas, drying yards and equipment storage.

Interior planning provides living rooms 13' x 16', bedrooms 10' x 12', bathrooms 6' x 8' and kitchens 6' x 8' with services back-to-back, adequate storage areas, exterior protected patios off living room, one level living area with no stairs. Total area of each couple's unit is 525 sq. ft. single units 360 sq. ft.

Construction Details: Waterproofed concrete slabs on grade, perimeter insulation around concrete foundations, frame wall and flat roof, insulated walls and ceilings, double glazing all glass areas, electrical heating thermostatically controlled, wall-to-wall carpeting in living rooms and bedrooms, cork tile in kitchens and bathrooms, all windows and doors provided with interlocking weatherstripping.

House of Mr Gordon Smith
West Vancouver, British Columbia

Architects, Erickson & Massey

General Contractor, Charles Nelson

View from the south

The clients are an artist and his wife and their requirements were for a one bedroom house with a studio.

The site is about an acre and is densely wooded primarily with cedar but with some arbutus and dogwood. There are numerous rock outcroppings and the site slopes gently toward the south. The building location is about a third of the way into the site and every effort was made to cut down as few trees as possible although some cutting was required to the south to let in light.

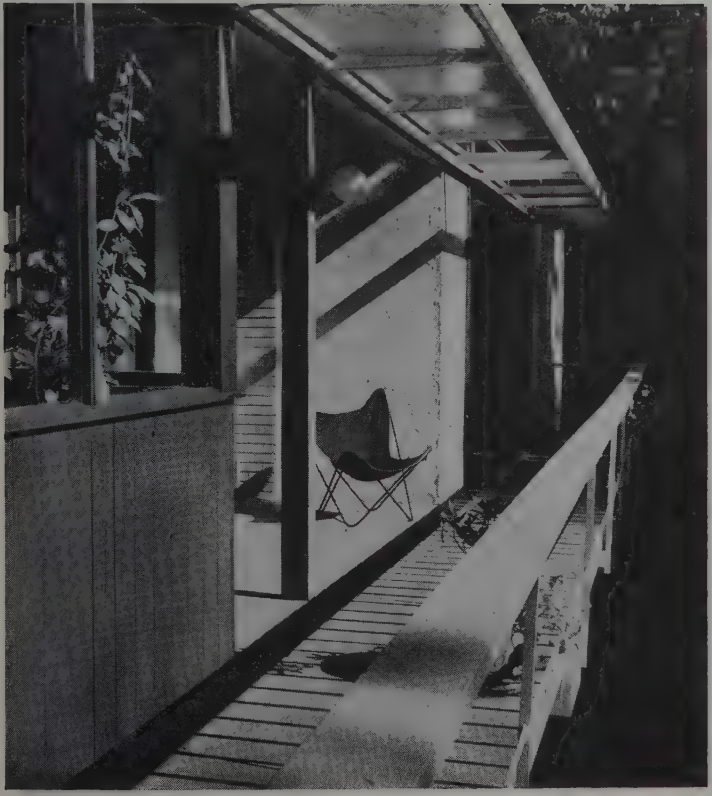
It was decided to lift the living quarters a floor above the ground and leave the damp forest floor with all its ferns, moss and rocks as near as possible to the way it was found. This permitted parking under the house and enable the studio to extend two storeys in height.

Glazed overhangs were provided over all windows and doors on the second level to let in light coming down through the tree tops and protect the windows from rain.

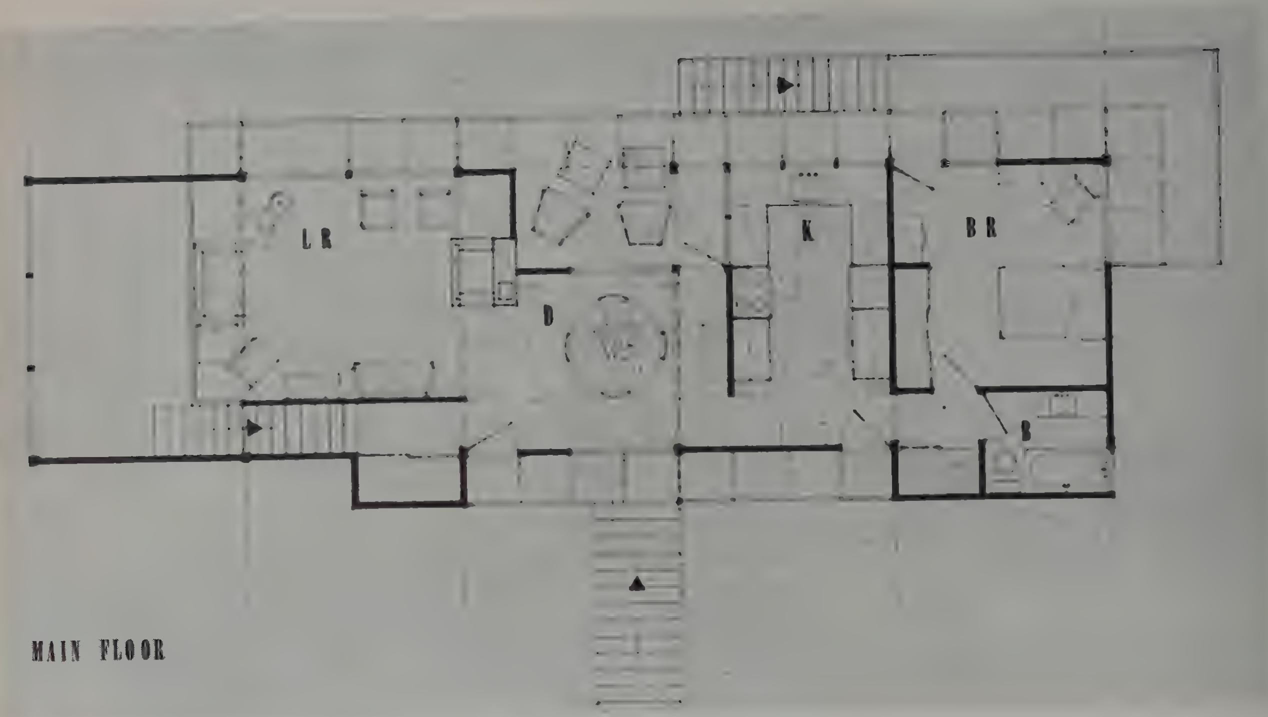
Area: 1376 sq. ft. approx. enclosed.

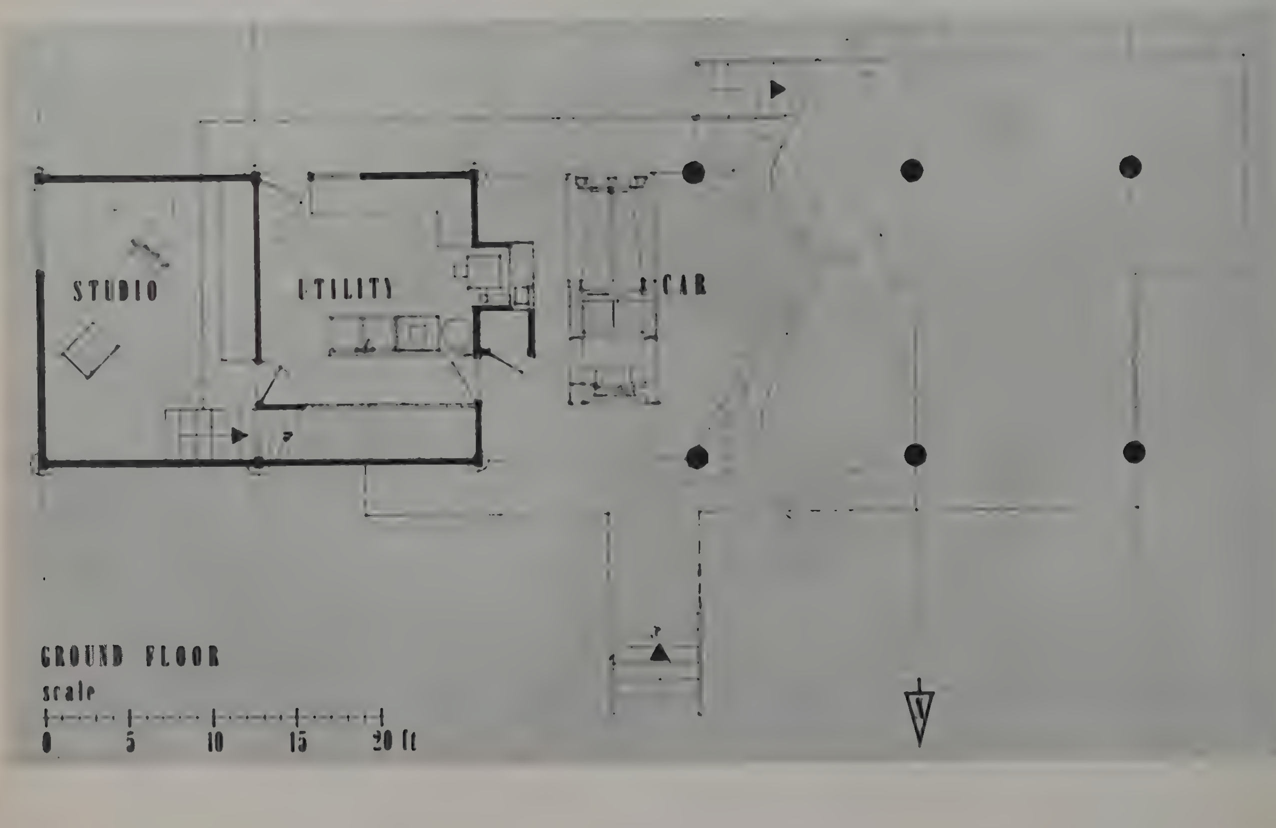
Heating: Hot air by oil fired furnace.

Construction: Post and beam. Concrete columns: 12" I.D. concrete culvert filled with concrete and reinforcing. Exterior finish: stucco and vertical cedar siding. Interior finish: drywall throughout. Roof: tar and gravel. Chimney: brick.



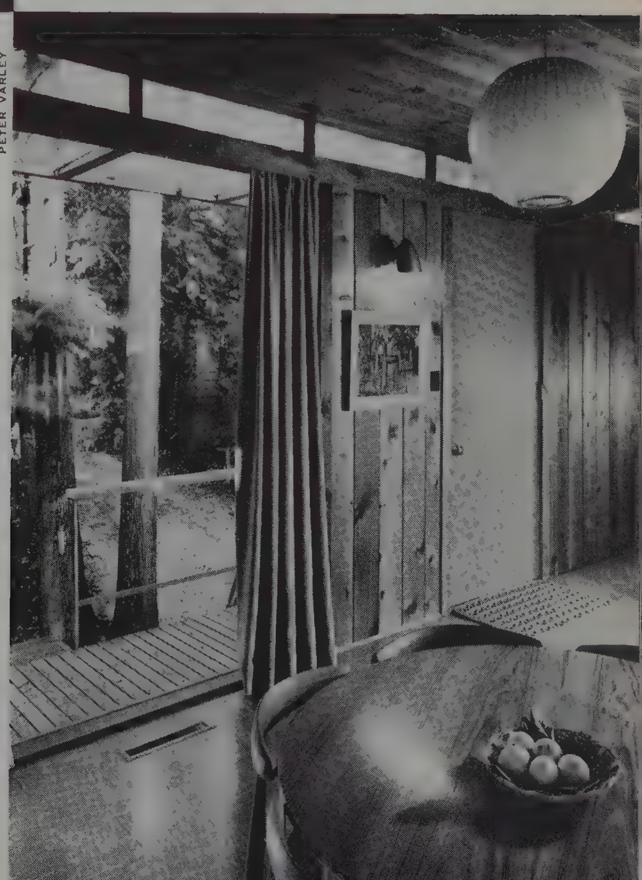
A corner of the south balcony


LR
D
K
BR
B
MAIN FLOOR


STUDIO
UTILITY
CAR
GROUND FLOOR
scale
0
5
10
15
20 ft
N

Fireplace on left
Dining area from living room

PETER VARLEY



View from dining area

Two detailed views of the south front

View of living room from dining room

PETER VARLEY

WOLF KOENIG

Problem

— *small lot, 50 feet wide.*
— *street on south side.*
— *existing garden at north.*
— *adjacent houses 2 stories each within 2 feet of lot lines.*
— *10 feet difference of levels between southeast and northwest corner.*
— *childless couple with occasional house guests.*
— *budget $17,000.*

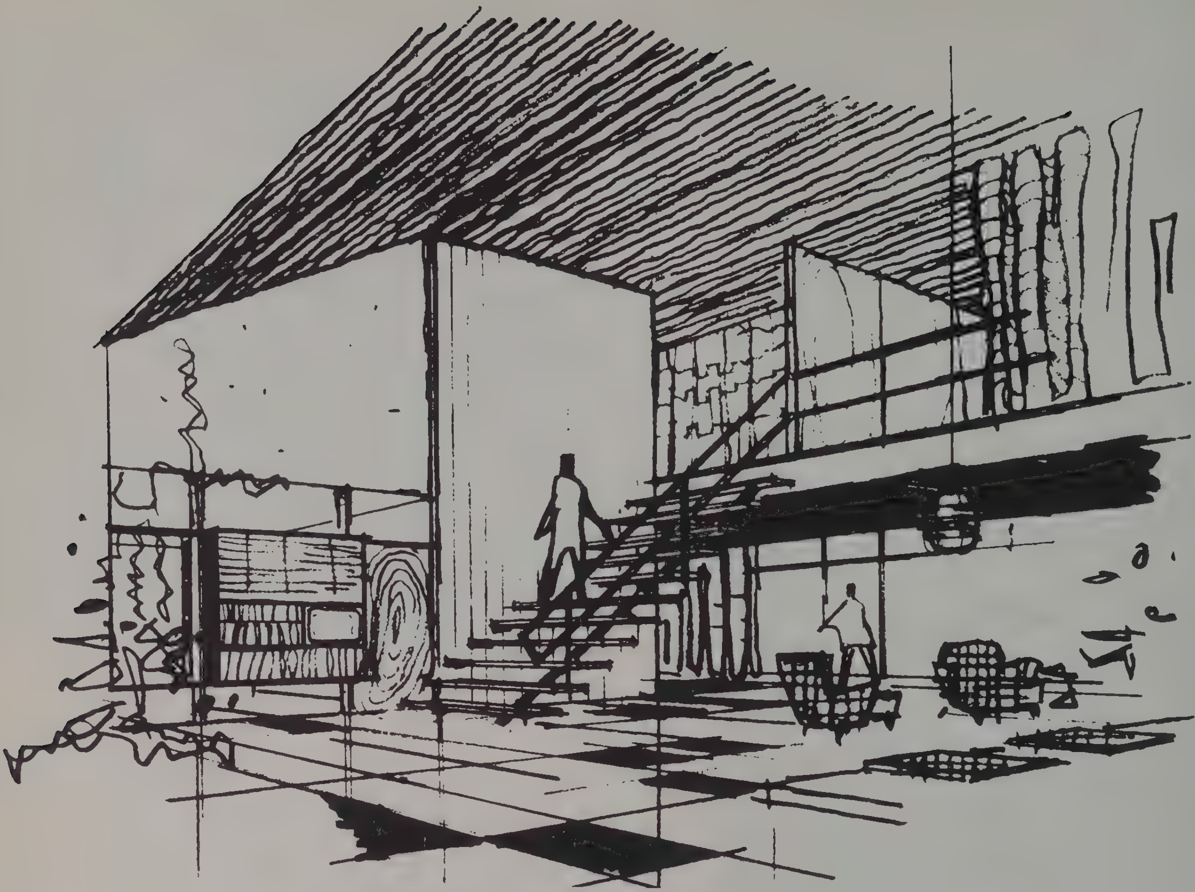
Solution

— *28' wide house, with all important rooms facing north and south.*
— *carport and basement level with street.*
— *main entrance split level between first floor and basement.*
— *main floor level with garden in rear.*
— *eave-line in rhythm with adjacent houses.*
— *the comparatively small living room becomes spacious*
1) by being openly connected with the dining room,
2) by, visually, the glass-enclosed entrance,
3) by making the south part of the room 1½ stories.
— *living and dining room wraps around the service centre to give a view and an entrance into the garden and also to get sunlight from the south.*
— *all plumbing concentrated in one stack.*
— *kitchen has direct access to entrance and dining room.*
— *balcony study provides secluded work area without being excluded from living room.*
— *this area can be separated into an additional guest bedroom.*
— *materials used: Gray Roman brick*
Driftwood stained cedar
Natural finished frames with
vermillion red and yellow painted sash.

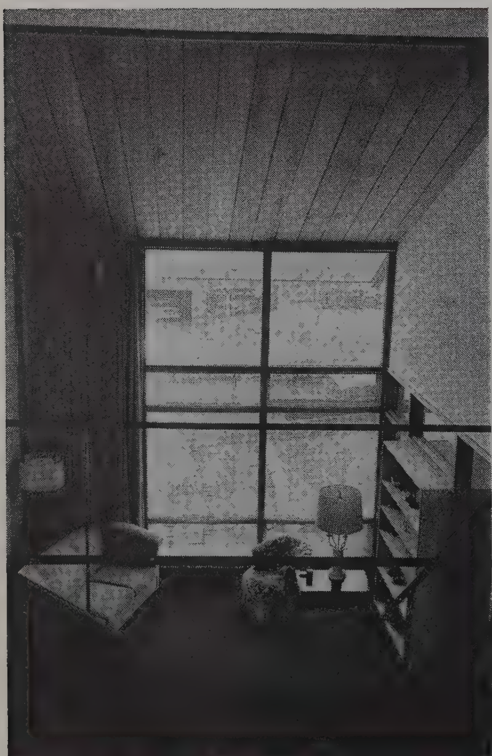
Hamilton House, Peterborough, Ontario

Architects, Blackwell, Craig and Zeidler

General Contractor, Jack Kinsman



The study

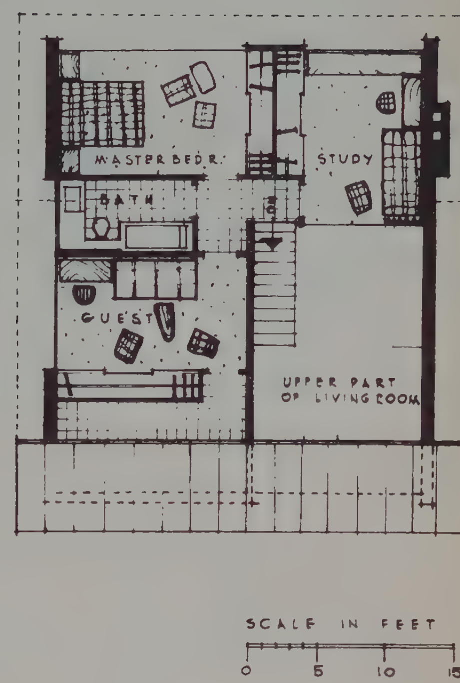


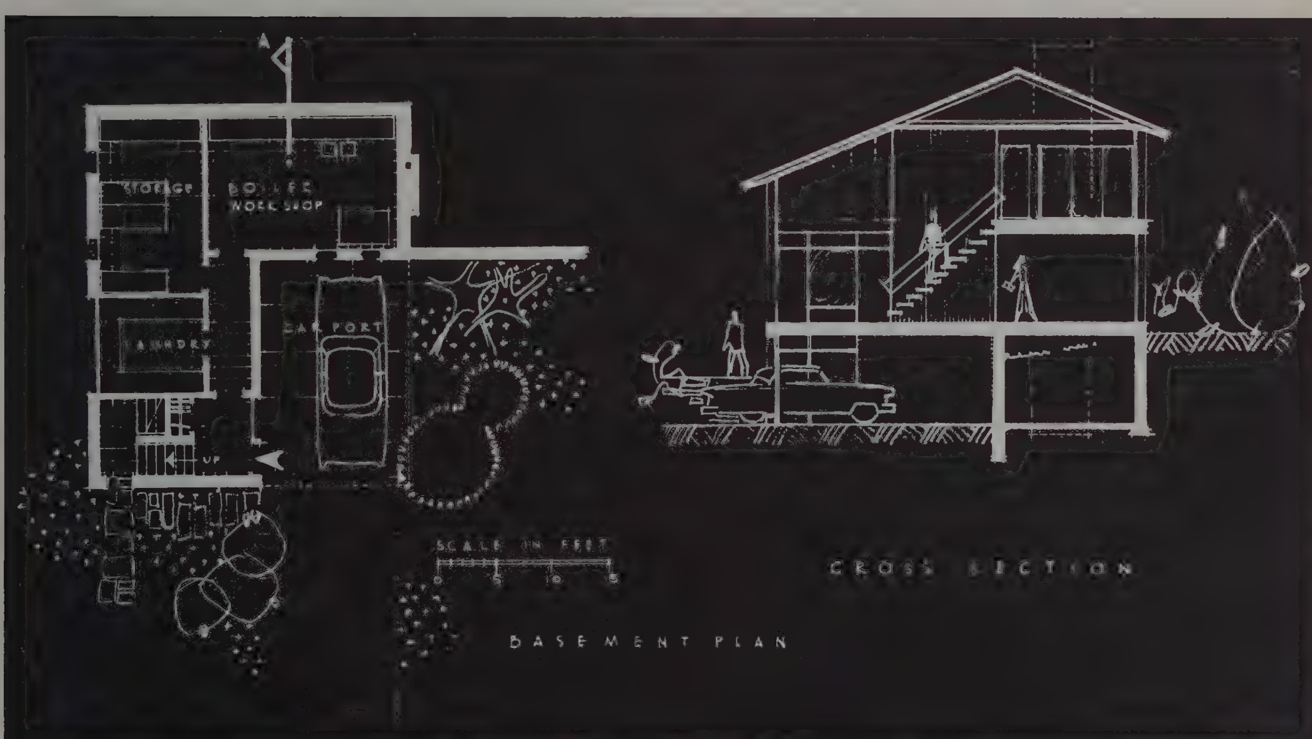
WOLF KOENIG

Living room showing gallery

WOLF KOENIG


LIVING
KITCHEN
UP
DN
CARPORT BELOW
NORTH


MASTER BEDR.
STUDY
BATH
GUEST
UPPER PART OF LIVING ROOM
SCALE IN FEET
0
5
10
15

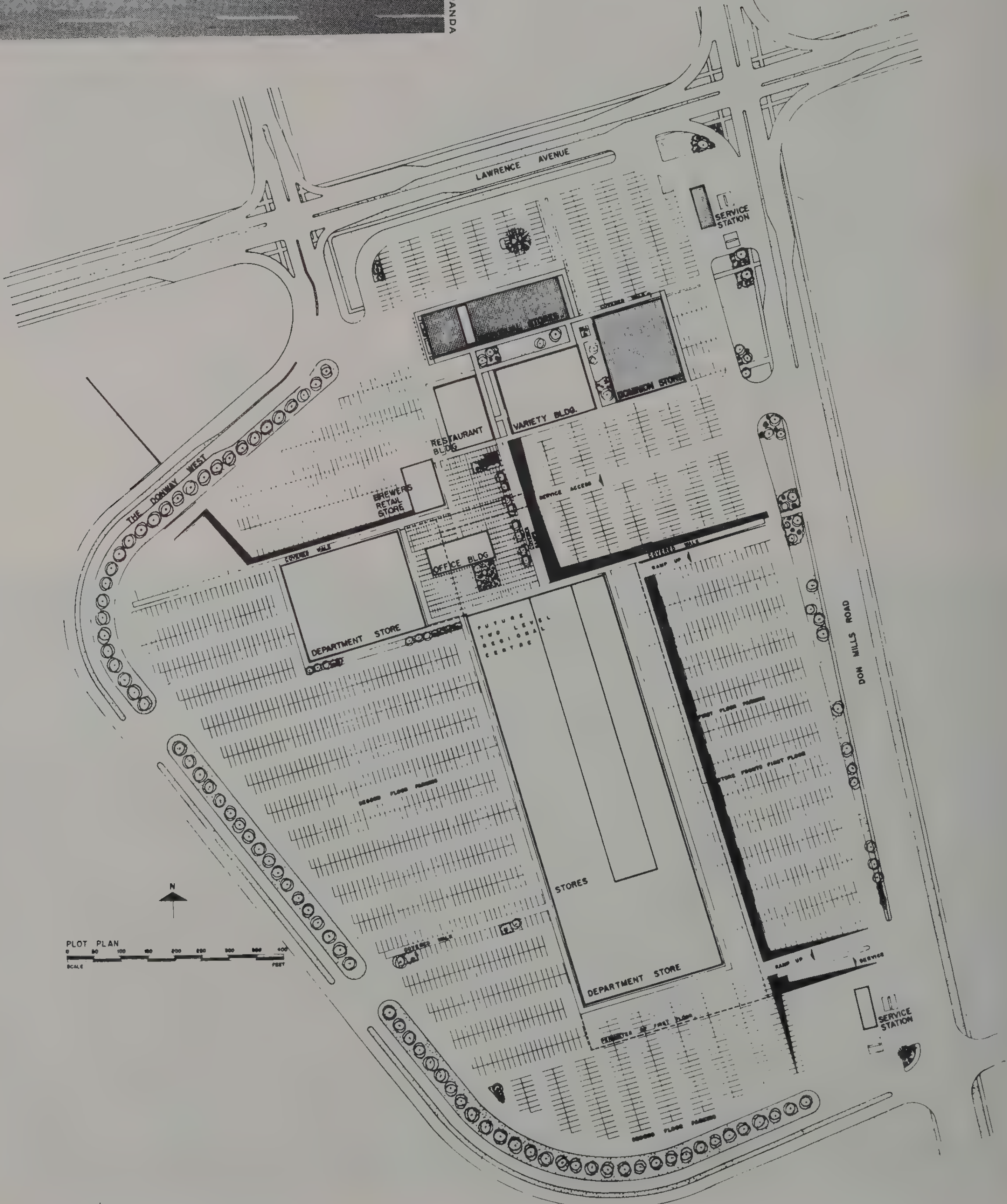

STORAGE
BOILER
WORK SHOP
LAUNDRY
CAR PORT
UP
SCALE IN FEET
0
5
10
15
BASEMENT PLAN
CROSS SECTION

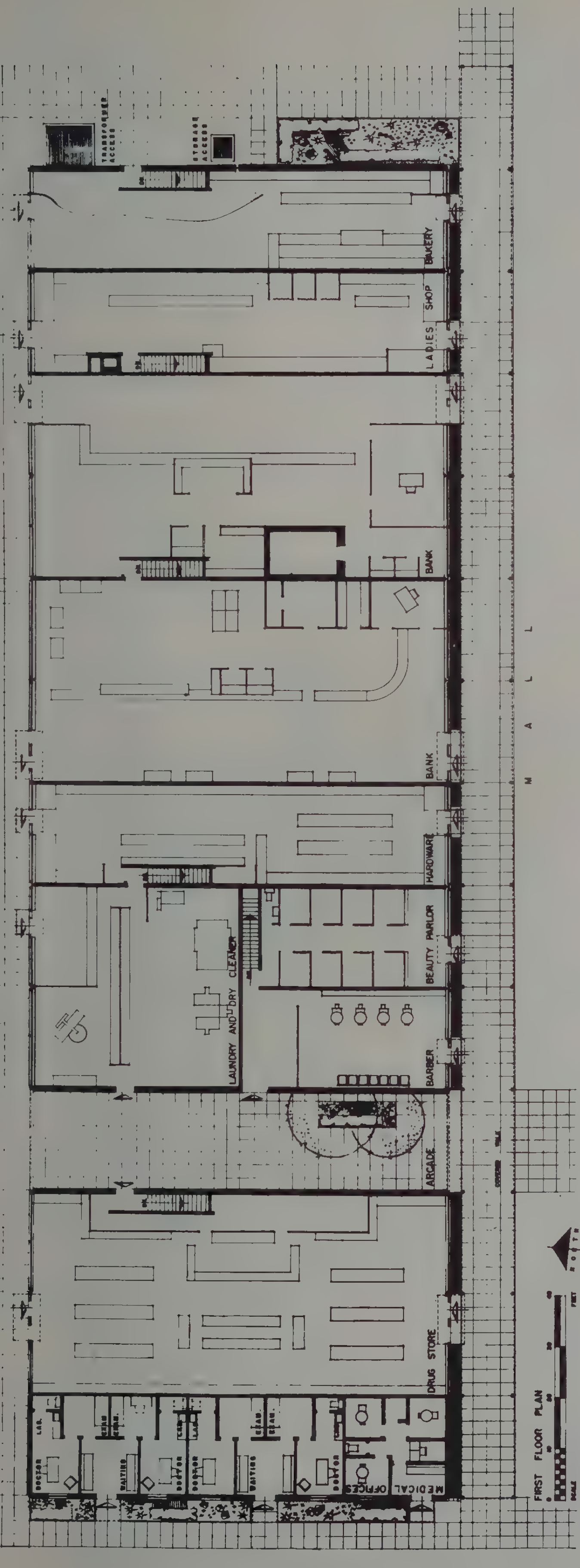
HUGH ROBERTSON—PANDA

Convenience Centre, Don Mills, Ontario

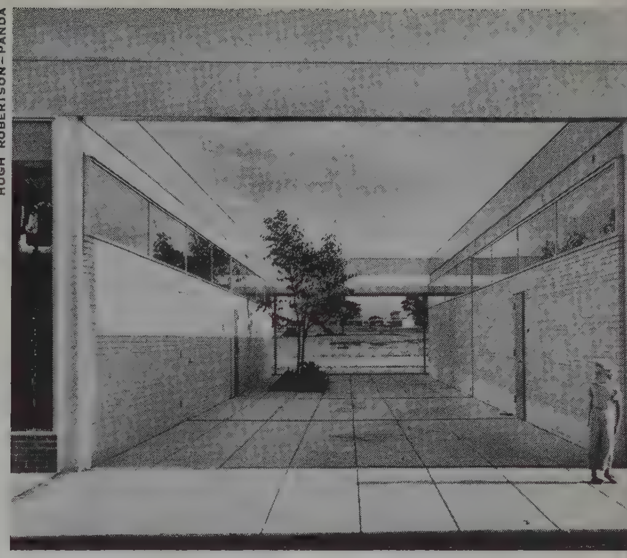
Architects and Engineers, John B. Parkin Associates

General Contractors, R. G. Kirby & Sons Ltd.



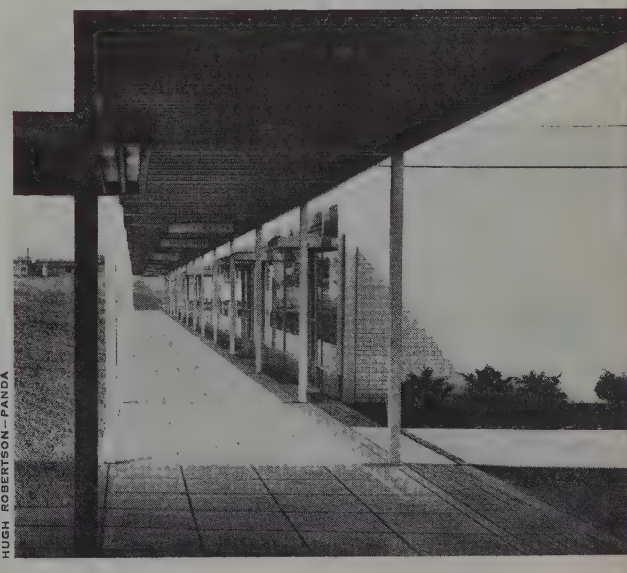


HUGH ROBERTSON—PANDA

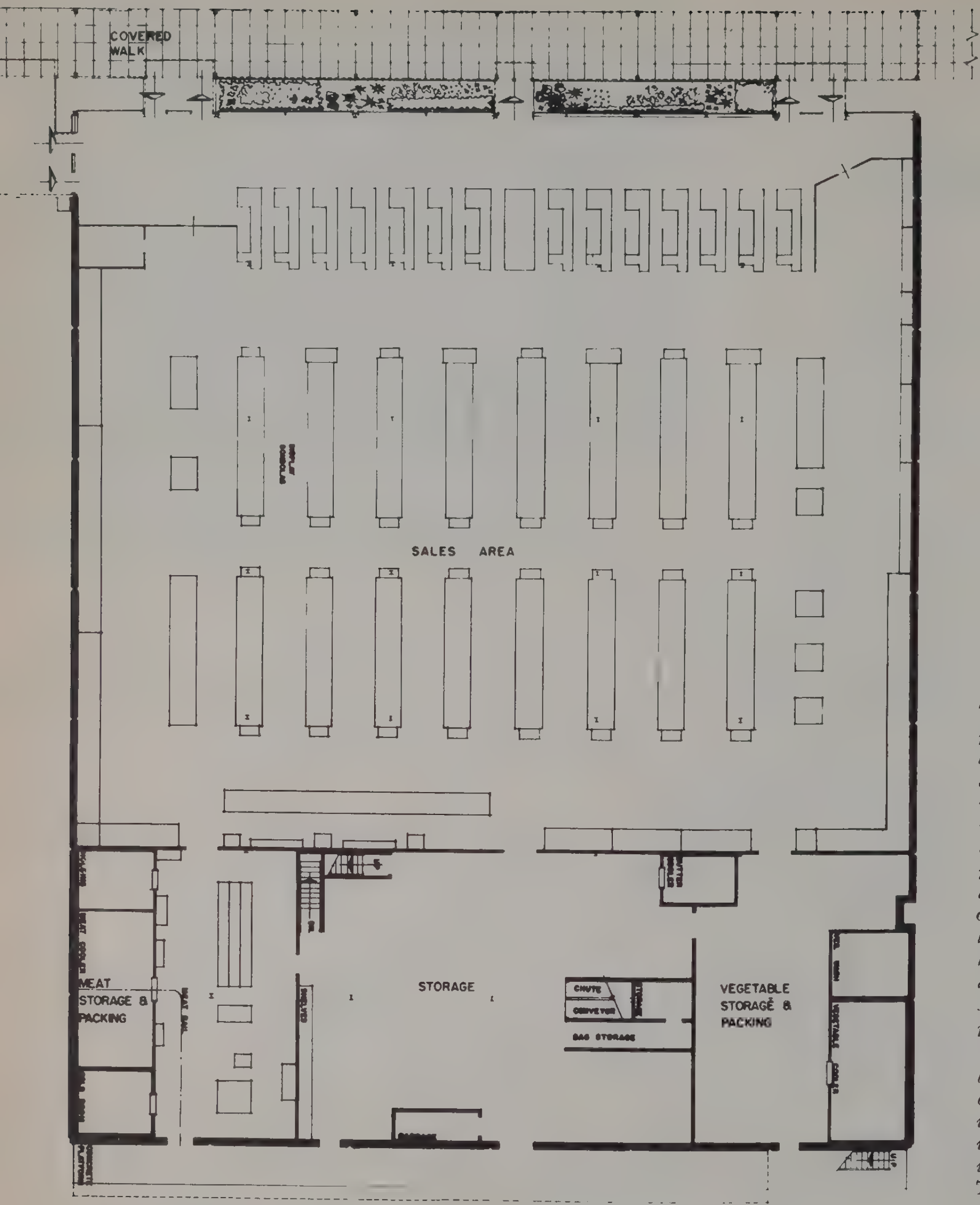


The arcade

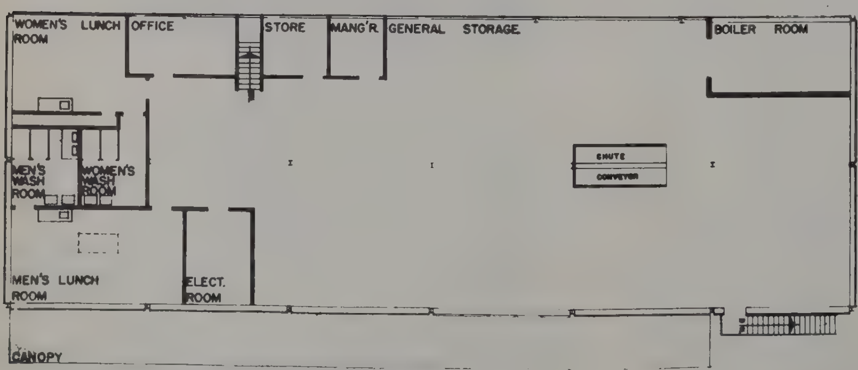
Shops on the mall



HUGH ROBERTSON—PANDA



FIRST FLOOR PLAN



MEZZANINE PLAN

Dominion Store

The Convenience Centre is the first completed portion of the Don Mills Shopping Centre, a development which eventually will occupy an area of approximately 40 acres. This problem was of particular interest to the architects inasmuch as the complex also forms part of the centre of a new town — unlike many contemporary shopping centres which reflect a drift away from downtown to locations on the fringe of an existing urban development, e.g. Northland, Detroit, and Shoppers' World, Framingham, Mass. The problem thus presented was to achieve a civic character in the design whilst still retaining the vigour and stimulating expression of competitive merchandising.

Of necessity, the development comprises buildings of diverse shape and volume and to obtain coherence a module was established which would be satisfactory structually and which would also relate to desirable store widths and automobile parking requirements. The units in the complex are related to each other so that the spaces enclosed become significant either as landscaped malls or parking areas.

The stores have double entrances and may be entered from the principal malls or directly from the parking areas. On the mall side the stores are connected by a continuous covered walk. The development company fortunately covered sign control in its leasing arrangements with the store operators and this enabled the architects to select type-faces and sizes.

Glazed brick panels under the store fronts are in various colours (although one colour, only, is used in each building) and further accents of colour are provided in the soffits to the covered walks, service doors and signs.

HUGH ROBERTSON—PANDA

Service station

HUGH ROBERTSON—PANDA

The fascias and columns of the buildings are covered with heavy gauge anodized sheet aluminum, the storefront members and the window stools are anodized extruded aluminum sections. The covered walk columns and fascias are exposed steel painted with welded connections. Soffit of the covered walk and of the canopies at the entrance doors is steel deck with baked enamel finish.

Inside the stores, walls are plastered, ceiling is acoustic tile, floors asphalt tile (except in supermarket where terrazzo floors were used), and the walls enclosing stairways are plywood panelled with natural finish.

View across parking area

HUGH ROBERTSON—PANDA

The site created an immediate problem of organization because of the proximity of the main factory building and other industrial plants nearby. The architects therefore attempted to separate the office building physically as far as possible from the adjacent buildings, and visually by means of an eight foot brick wall surrounding a landscaped court.

The plan, aside from its development into an L-shape, was dictated by the Company's quite simple basic requirements in that the general office and executive offices be on the ground floor, with the engineering and purchasing department on the second.

Structurally the building is reinforced concrete but utilizing a precast structural mullion design on exterior walls. This eliminated any exterior wall columns and because of the overall modulization on a four foot module made for economy through repetition of elements. The exterior surfacing of spandrels is English faience tile in a soft yellow colour. Same granite was used on exterior and interior walls in the waiting area. Floors generally are rubbertile with carpet in the President's Office and Board Room. Ceilings are acoustic tile throughout.

The exterior sash is aluminum and heat reducing glass is employed on the court side elevations.

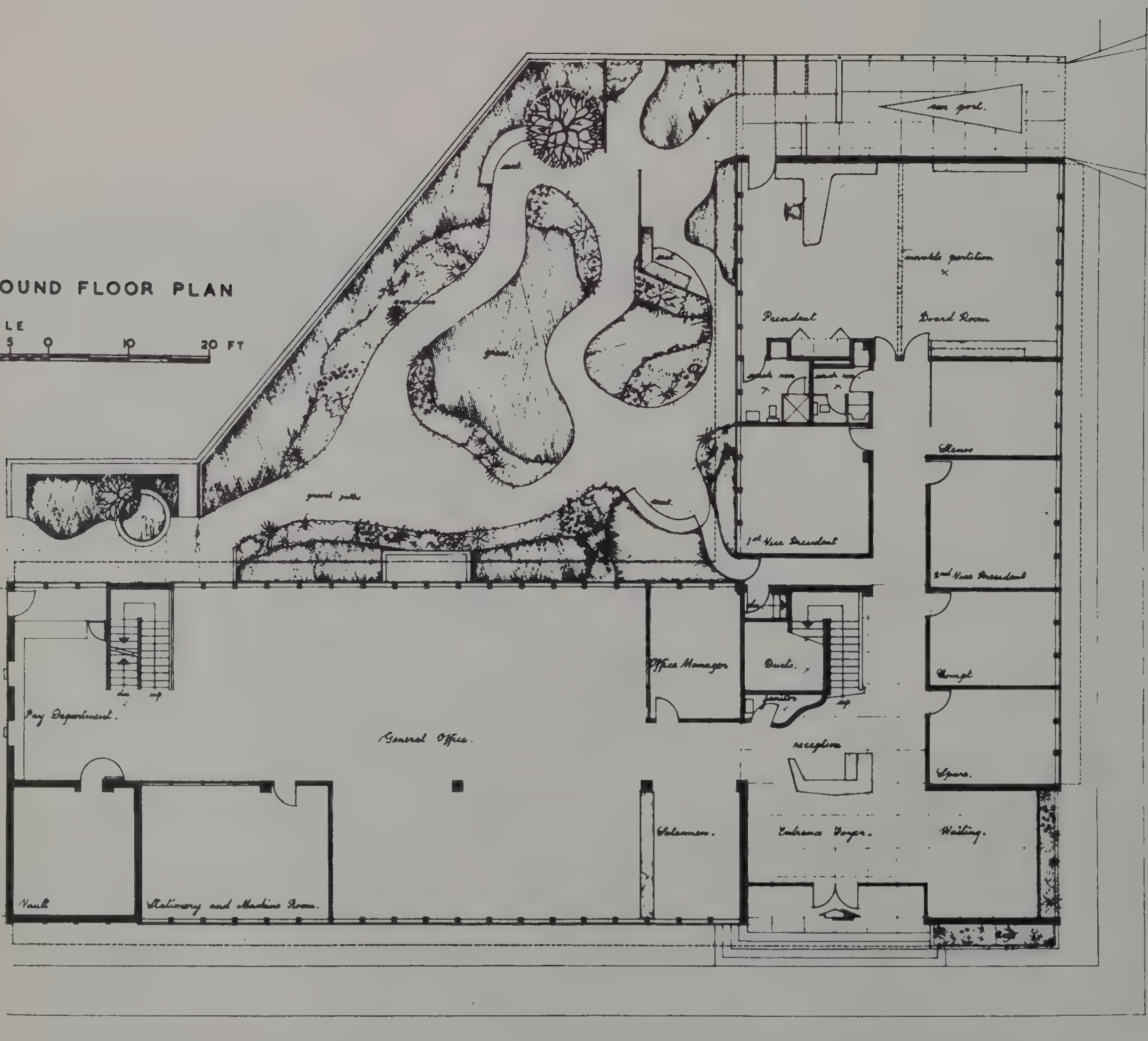
The building is hot water heated and fully air-conditioned.

BC Sugar Refinery, Limited
Vancouver, British Columbia

Architects, Semmens and Simpson

GROUND FLOOR PLAN

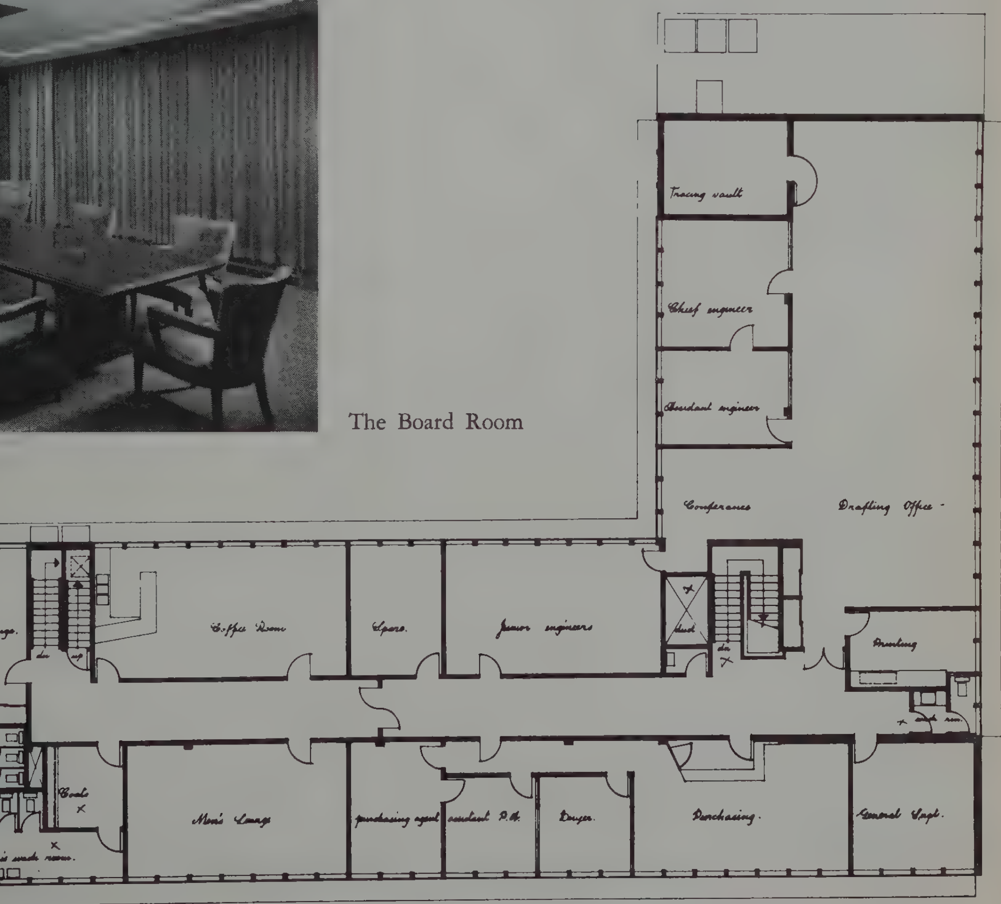
SCALE 10 5 0 10 20 FT



GRAHAM WARRINGTON

GRAHAM WARRINGTON

The Board Room



SECOND FLOOR PLAN

GRAHAM WARRINGTON

GRAHAM WARRINGTON

The garden court

GRAHAM WARRINGTON

Entrance foyer

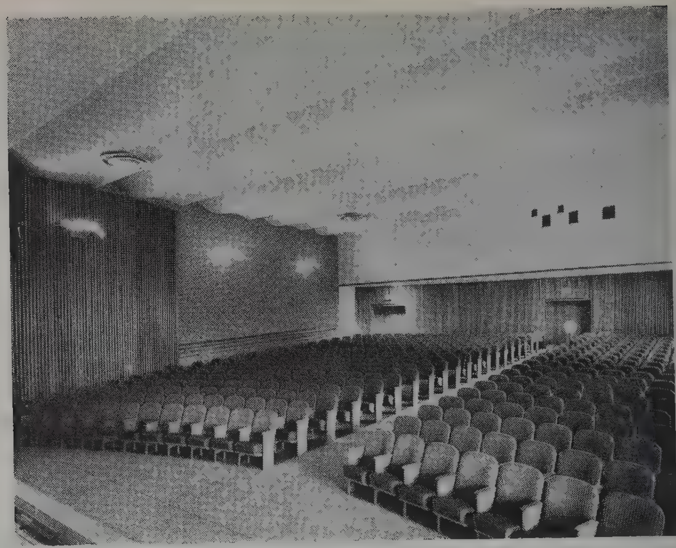
Toronto Teachers' College, Toronto, Ontario

Architects, Page & Steele

Landscape Architect, H. B. Dunington Grubb
Structural Engineers, Wallace, Carruthers & Associates Ltd.
Mechanical Engineers, J. A. Norton & Co. Ltd.
General Contractors, Fried Construction Co. Ltd.

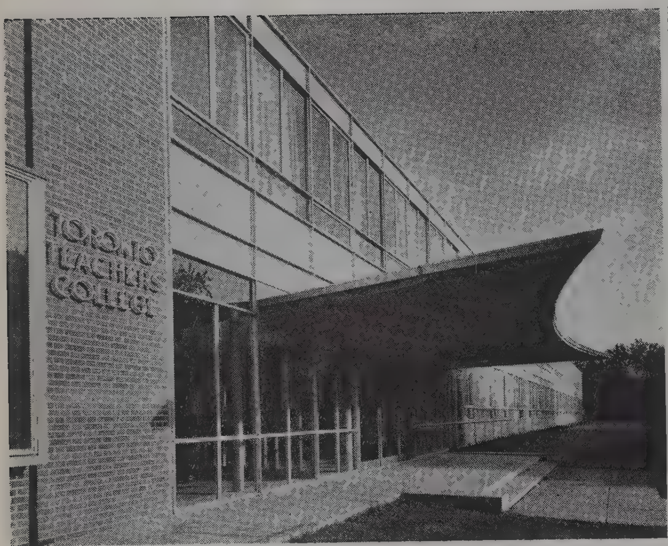
The reflecting pool

HUGH ROBERTSON—PANDA



HUGH ROBERTSON – PANDA

The auditorium

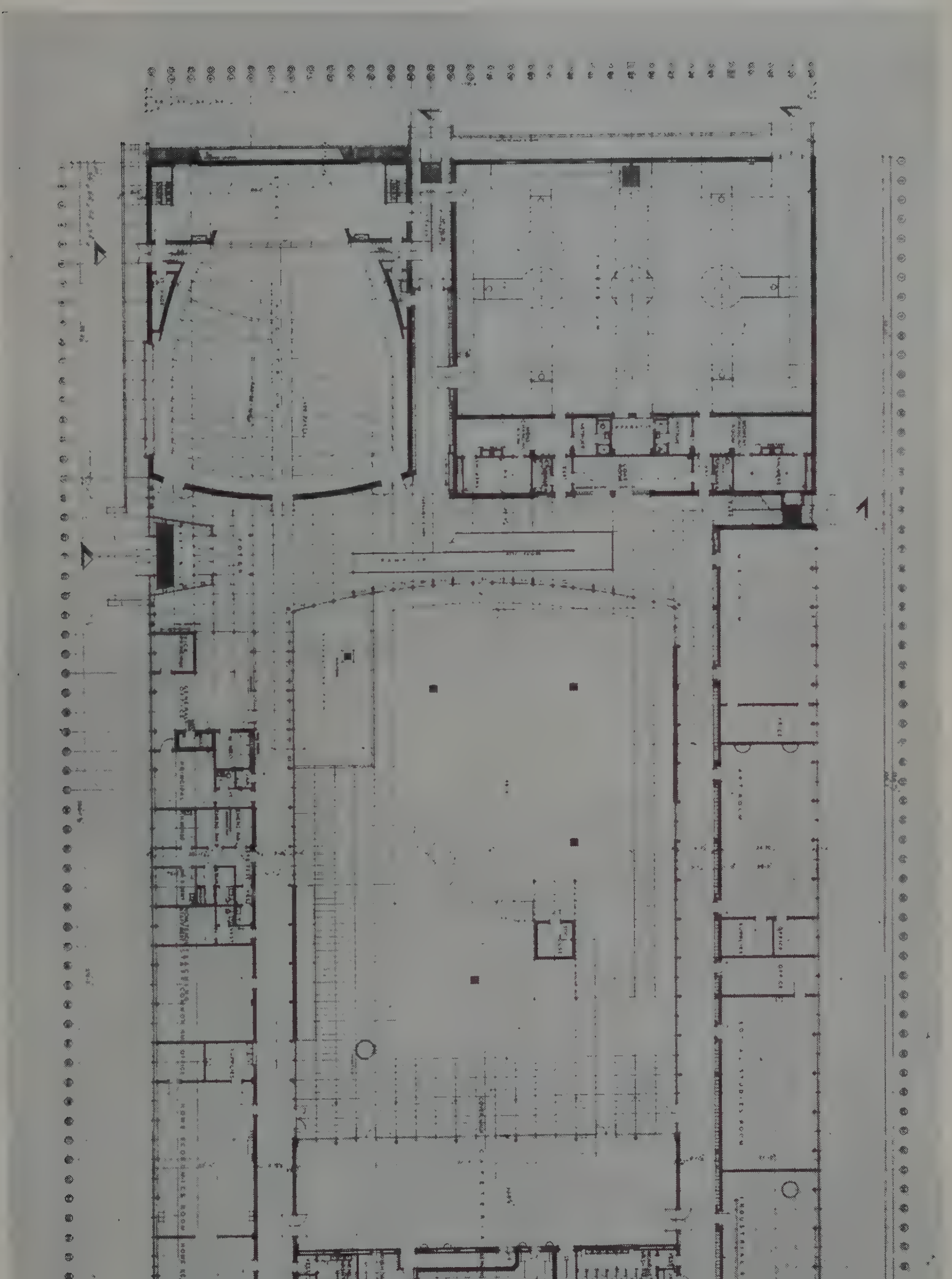


HUGH ROBERTSON – PANDA

The main entrance

The entrance front

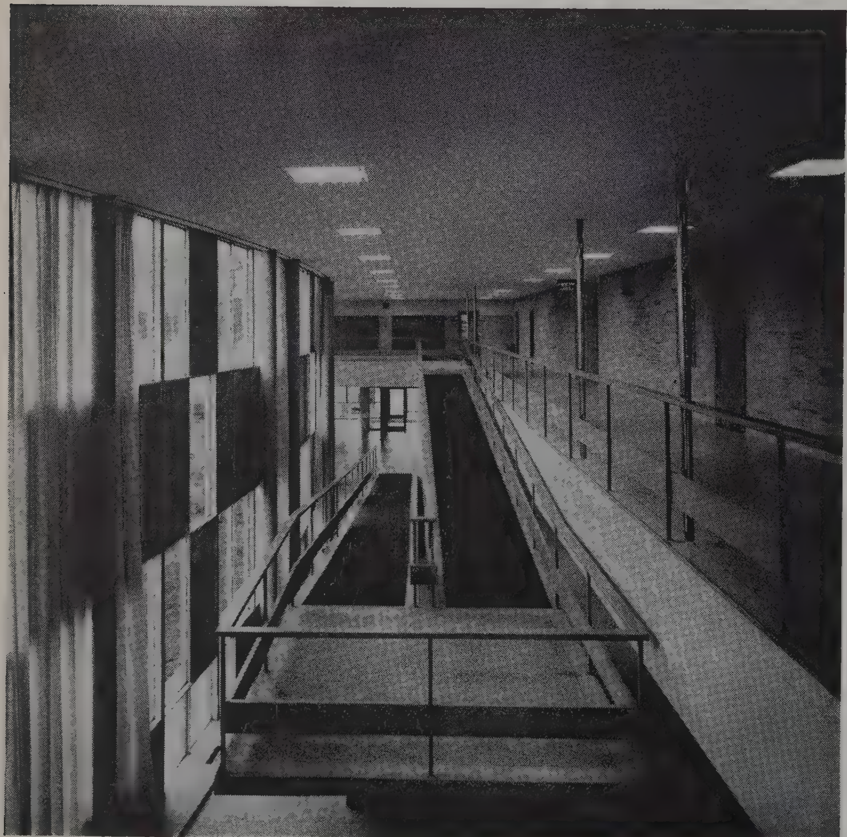
HUGH ROBERTSON – PANDA



First floor plan

HUGH ROBERTSON—PANDA

The court



HUGH ROBERTSON—PANDA

The site is at Carlaw, Mortimer and Pape Avenues immediately behind the old normal school. The problem was to design a compact building on a relatively small site in a built-up area with the privacy and site amenities of a building ideally located in more spacious surroundings. For this reason, the architects decided to create a large internal landscaped and terraced court within the building, similar in character to the old courts and quadrangles of the university cities of Europe. The success of this idea was well demonstrated during the first autumn of its use in that it was used every day as a sitting out area in the lunch period. On one occasion it was floodlit at night for a large student Hallowe'en party, an outside activity which would otherwise have been impractical in this area.

The building accommodation is for 700 students and includes 20 special classrooms, an auditorium for 600, a double gymnasium, a large library, reading rooms, cafeteria and common rooms for staff and students and an administration area with a small health centre.

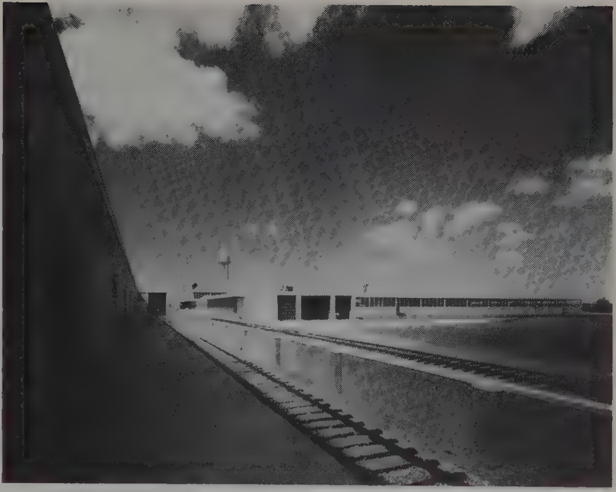
The structure is framed in steel and has brick and aluminum curtain walls. The ramp in the foyer, which is extensively used, is built of reinforced concrete and surfaced with corrugated rubber. The pool is floodlit at night and contains an abstract steel sculpture cocooned in vinyl plastic. The court is watered with a sprinkler system.

The ramp

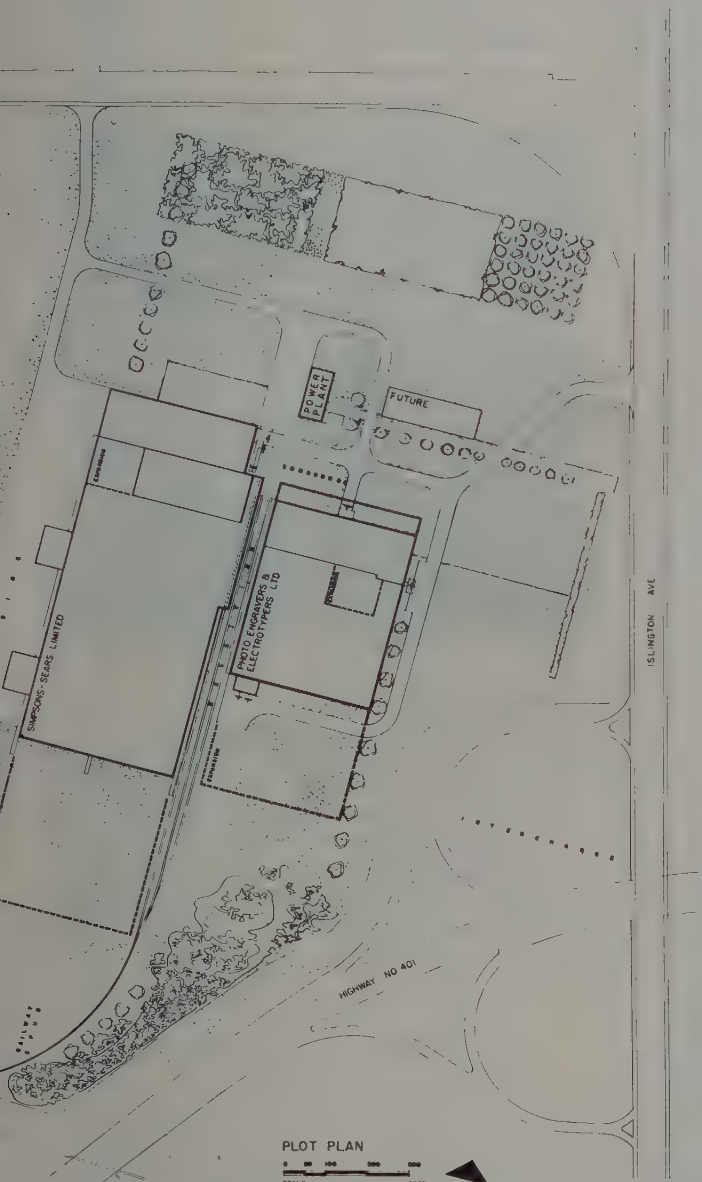
Simpson-Sears Industrial Development
Etobicoke, Ontario

Architects and Engineers, John B. Parkin Associates

General Contractors, Foundation Company of Canada Ltd.



HUGH ROBERTSON—PANDA



PLOT PLAN

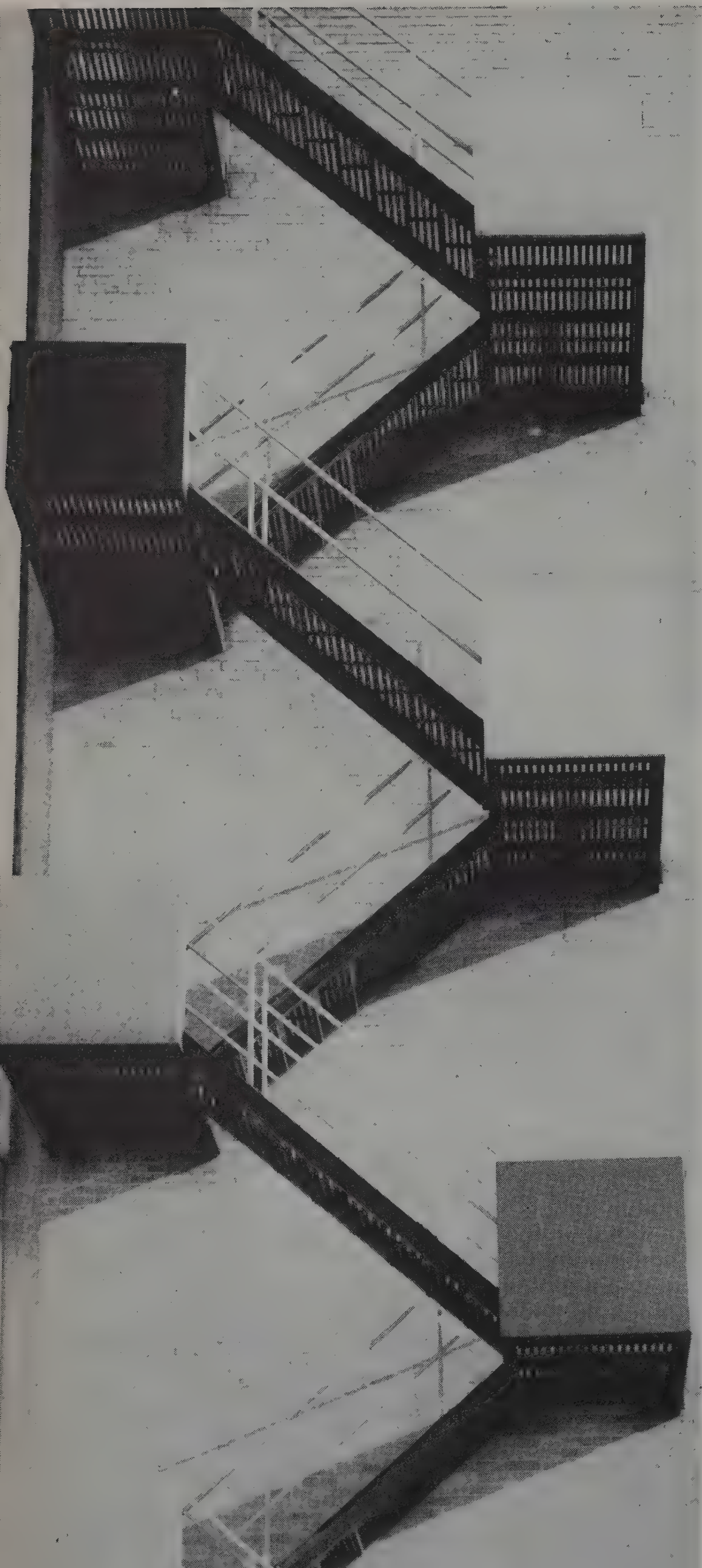
Simpson-Sears Limited acquired a site in Etobicoke bordered by Islington Avenue and Malton Road at the Clover Leaf of the newly completed Highway 401. With the CNR railroad along the south boundary, immediate rail and road transport provided a very valuable centre for the huge mail-order goods distribution.

The Warehouse of 417,000 square feet is of flat-slab reinforced concrete construction with 20'-0" ceiling height on the main floor which is divided into three fire-isolated cells and a covered rail siding. Offices are on the second floor as well as kitchen and cafeteria for 300.

The plant of Photo Engravers and Electrotypers Limited is sited across the double-track external siding. This building houses all the offices as well as the presses and special equipment and process rooms used in most advanced colour illustration and printing. Storage area, mainly for paper, occupies about half the main floor. An elevator carries material direct from rail platform to basement press floor below.

The Power Plant is coal-fueled and produces steam both for heating and printing process work. It forms a service core including water storage tank for fire protection and electrical substation and has provision for increasing capacities to service a future soft goods annex and a multi-storey office block. A fire escape from the equivalent fifth floor above the coal hoppers is cantilevered from a wall face and provides a focus of attention at this large scale by use of differently coloured porcelain enamel panels on every landing, already a landmark on Malton Road. An underground tunnel connects to the warehouse basement and is used for garbage disposal as well as carrying all service lines.

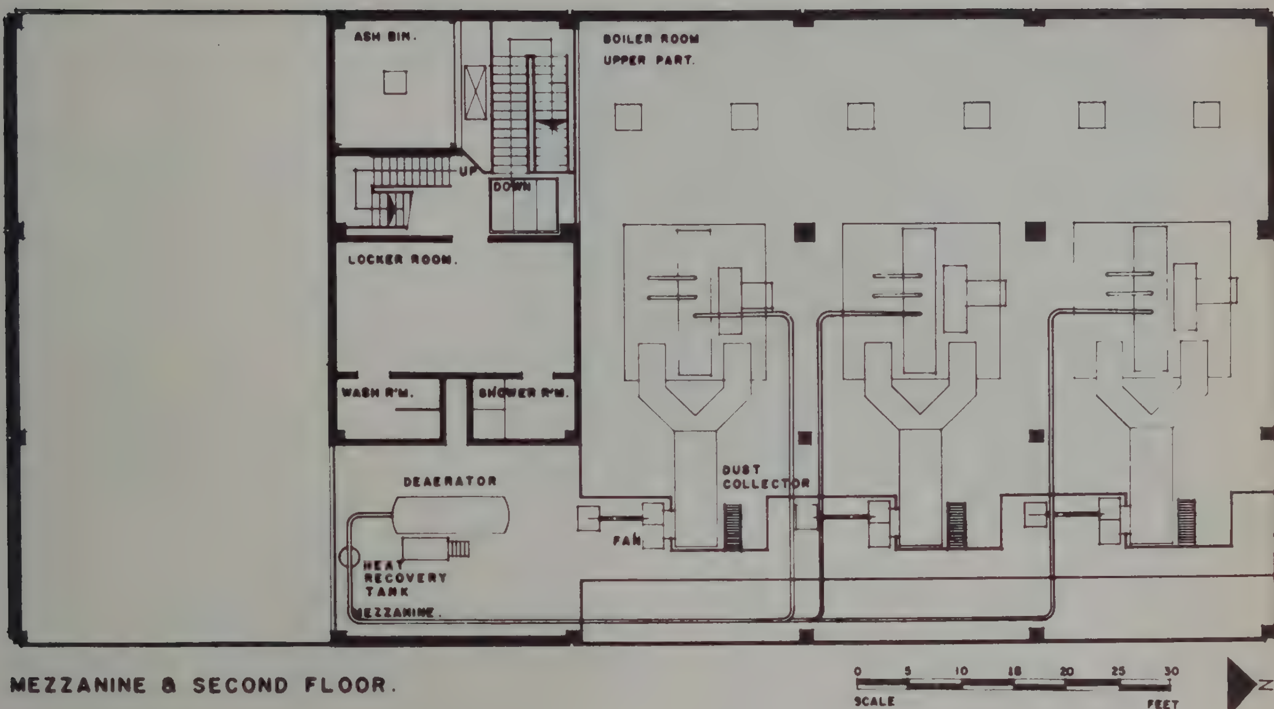
HUGH ROBERTSON—PANDA



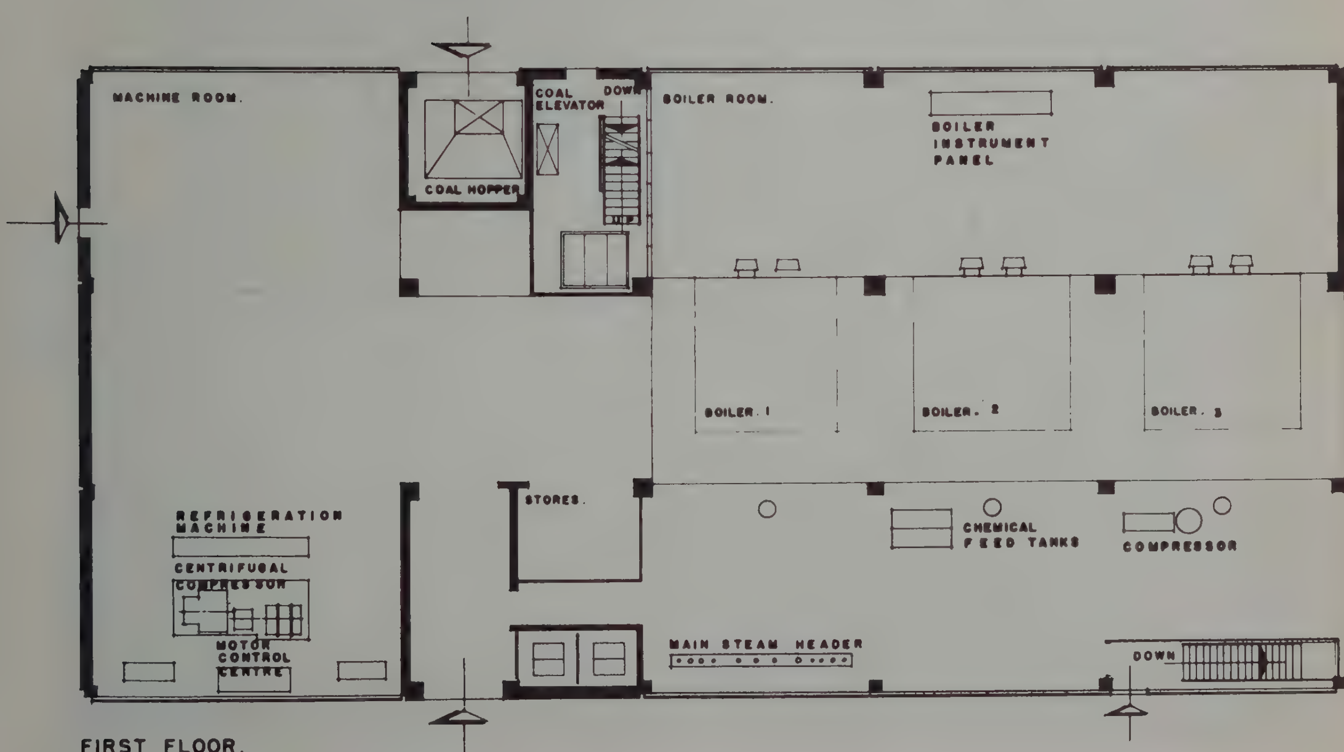
HUGH ROBERTSON—PANDA

HUGH ROBERTSON—PANDA

An effort was made to solve the problems of road and rail circulation, allowance of future expansion and a good disposition of the buildings. The siting presents a three sided court-type enclosure with considered integration of parts and relation of volumes. Exterior materials were generally restricted to brick, painted steel or smooth concrete and steel industrial sash. By consistency of form and details a unified group emerges and will later be enhanced by the owner's program of additional landscape planting.



MEZZANINE & SECOND FLOOR.



FIRST FLOOR.

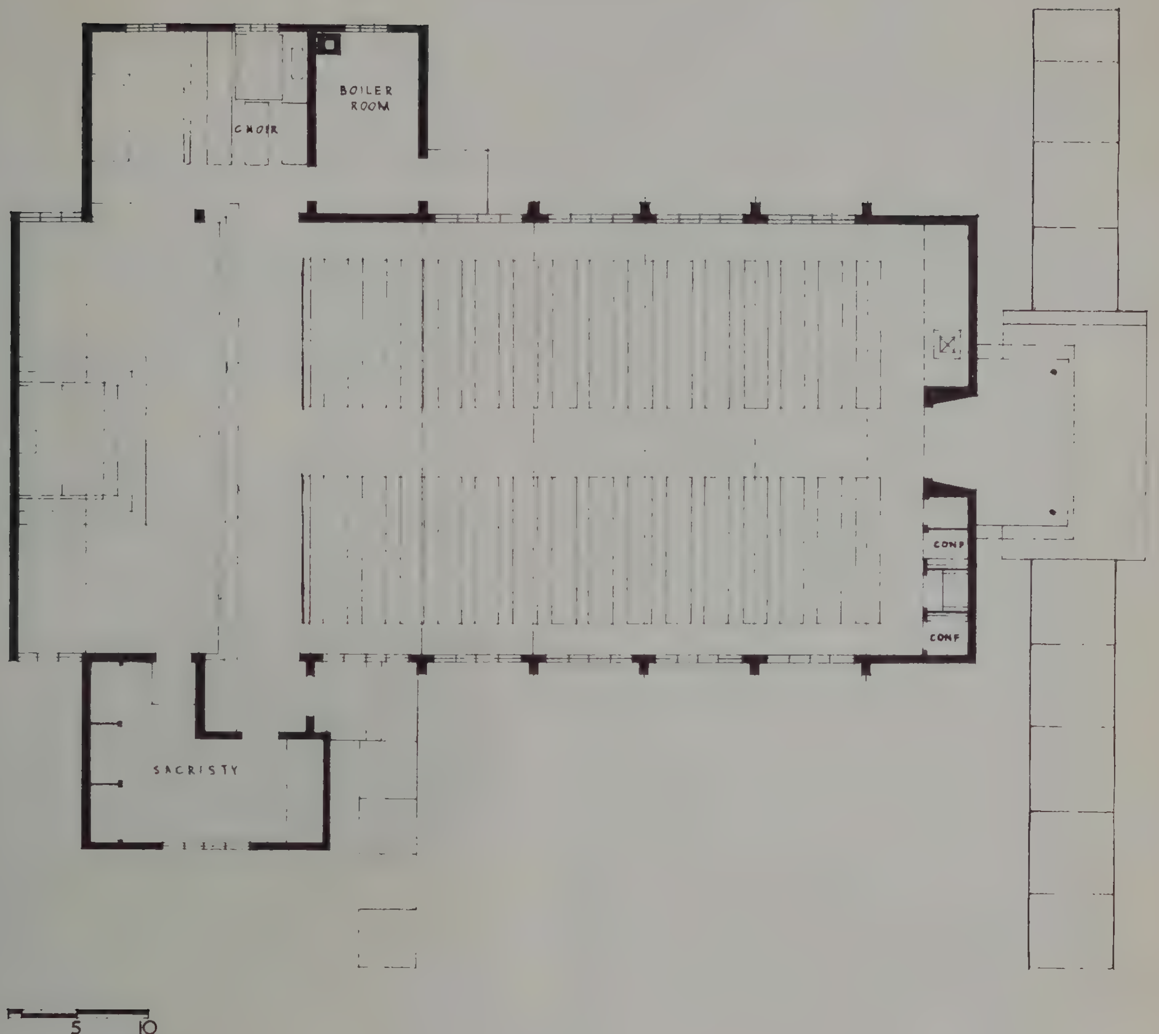

SELWYN PULLAN

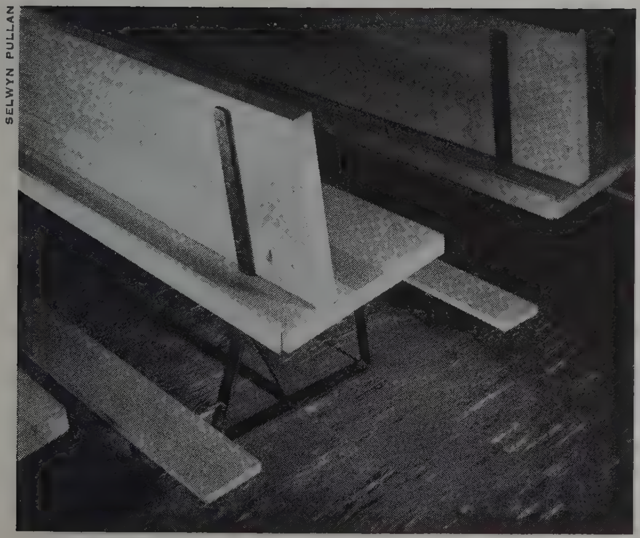
St. Anthony's Church
Agassiz, British Columbia

Architects, Gardiner, Thornton, Gathe and Associates

Contractors, Built by day labour and subtrade contracts


SELWYN PULLAN





Church
— *seats 230*

Cost
— *including all trades and furnishings, slightly over $20,000.*

Construction
— *concrete foundations and floor.*
— *reinforced concrete block piers, frame walls.*
— *scissor trusses @ 8' 0" o.c. Cedar plank roof.*
— *heating: oil fired hot air, floor duct returns.*
— *lighting: fluorescent industrial fixtures between truss members.*

VIEWPOINT

State your views on design control, i.e., the control by a properly appointed committee of experts (presumably architects) who have the authority to pass on new buildings on important streets.

Design control? Who will do it on what basis?

Our trends in architecture and city planning are fighting their way up over a European crust. Actually, I do not think there is a man knowing what our cities will be like even in the near future: chances are that they will be rebuilt before the final settlement of our culture. Design control would then be making the crate for an unknown product.

So, I would advocate the soft pedal on design control: I would suggest a board made up of rather young men; architects, city planners associated with a solid architectural critic (if there is such an animal).

First move: get more interest in beauty from politicians. Second move: do not give important jobs to bad designers.

Paul Béland, Quebec

Design control for all buildings is desirable. Under ideal conditions the design of all buildings would be entrusted to qualified persons and no further control would generally be required. When, as now, conspicuous construction proceeds without qualified regard to design, more good than harm would arise from subjecting all proposed buildings to some sort of scrutiny.

Where an attempt is made to make a street or a designated-area the design unit, it seems obvious that individual owners and architects, regardless of their competence and good intentions, must of necessity submit to design restrictions.

J. F. Brennan, Toronto

An evident opportunity to create a magnificent street has been missed again. The new widened Dorchester Street in Montreal is growing a strungout façade of car showrooms, taverns and small apartments all jumbled together, one, two and three stories high along a noble and very expensive swath of roadway. Western fronts of Champs-Elysées!

The need for design control is obvious: but the solution of the problem goes beyond the capacities of a committee of men of good taste.

The big errors, say on Dorchester Street, are for town planners to solve matters of zoning legislation, height restrictions, plus and minus, land use restrictions, etc.

The existing disorder is not superficial. Ideally, the functions of such a committee should be included within the operation of the town planning department of a city. Actually, however, such a committee could do much right now in default of a mature planning organization by tackling the problem in a sense from the outside, and superficially to raise the thorny questions and at every opportunity to keep them before the municipal authorities.

Guy Desbarats, Montreal

It would be sad, indeed, if a profession that so jealously guards its right to control its professional ethics from within should have to admit that an external group of experts is necessary for the control of architectural design, if good design is to be achieved. Surely good manners must be learned at home. It is an unhappy family indeed that depends solely on the constraints of society to teach it good manners, whether or not these constraints are administered by so called experts. So it is with architects. If good design, born of good architectural manners, is to be achieved, it will come as a result of a keen sense of responsibility of the architect to society and a stringent self-imposed discipline.

John B. Parkin, Toronto

Each time we are commissioned to design a building in a built up area we are struck with the fact that we are more likely to create greater confusion (æsthetically) rather than to make a contribution to the betterment of the overall urban scene.

For this reason architectural control in principle is, I believe, needed, though it will not be easy to augment a body which of necessity must have authority, yet must not stultify good design through dictatorial methods.

Buildings in themselves are not however the greatest offenders against the urban visual scene. Control of public utility companies, civic authorities responsible for street furniture and signs, as well as building owners and tenants who create chaos with neon, is of prime importance.

If architects were to offer themselves to be disciplined, it might have the salubrious effects of gaining more public sympathy and hastening the control of the greater offenders.

Peter M. Thornton, Vancouver

Let us assume, for the sake of this discussion, that we are not dealing with the problems of zoning, setbacks and building lines, and let us worry about the effects of control on civic and building design. I would like to propose three types of control, not the only ones, but which I imagine to be fairly representative, and a last one which I believe to be a natural.

Control by the art-lover: to beautify our river front we must import the Paris banks of the Seine to Montreal; and isn't Regent Street so much more dignified than Saint-Catherine Street?

Control by the art-director: the City is a museum, the streets an exhibition; his job is to set up exhibitions of art objects; he just loves to shift paintings around (as he often is himself!) to suit his whims, to prove a point.

Control by the strong man: his idea is to stroll along Les Boulevards, admiring the great tree-lined perspectives and the orderly façades; happenings backstage must never be noticed or acknowledged.

Now of course, between these types and the local "committee of experts (presumably architects) who have the authority to pass on new buildings on important streets", there always lies an infinite difference, but somehow I always feel and fear that there may be some cousin who will link them.

Control by the citizen: Sherbrooke Street is not, I suppose, the most beautiful street in my mind (or even in Montreal's) but I would be rather worried about its fate if, for instance, any Montrealer were related to the Baron Haussman (except myself, of course!) or for that matter, to any of the other aforementioned experts. Civic design must be a mirror held up to the City and to its citizens, come what may.

Charles Elliott Trudeau, Montreal

NEWS FROM THE INSTITUTE

CALENDAR OF EVENTS

Annual Meeting of the Manitoba Association of Architects, University of Manitoba and the Royal Alexandra Hotel, Winnipeg, April 28th, 1956.

88th Convention of the American Institute of Architects, Hotel Biltmore, Los Angeles, California, May 15th to 18th, 1956.

Annual Meeting of the Nova Scotia Association of Architects, Halifax, May 18th, 1956.

Annual Meeting of the Engineering Institute of Canada, Mount Royal Hotel, Montreal, May 23rd to 25th, 1956.

British Architects' Conference at Norwich, England, May 30th to June 2nd, 1956.

Annual Assembly of the RAIC, Banff Springs Hotel, Banff, Alberta, June 6th to 10th, 1956.

MANITOBA

The problem of giving approval for material considered as equivalent to those specified for a project is becoming increasingly difficult with the number of new products available today. Not only are large numbers of similar appearing products available for a given use, but quite frequently there are totally different products submitted for approval, whose performance meets the requirements although the materials are physically not the same as those specified.

The problem is further complicated by the lack of an established time during the tendering period for approval requests, and inadequate test results and samples submitted with the request.

Recently an MAA Sub-Committee reviewed this problem and offered possible solutions. It was felt that the approval for equivalents should be up to the individual architect rather than to an equivalent's committee due to differences in material uses, but that a policy could be established with respect to time and material for approvals. Approval requests submitted in duplicate would enable the architect to retain a file copy and return a stamped copy confirming acceptance or rejection of the product in question. If specifications required approval reports to be submitted four to five days prior to tender due date, and stated definite requirements for samples and data pertaining to materials, the architect would have sufficient time to properly consider the products. In addition, complicated materials and method changes requiring detailed investigation should be submitted by the contractor as an alternate price, in order that they may be fully considered after the close of tenders. This would keep the bidding on a proper competitive basis and still enable the architect to take advantage of any savings.

James E. Searle, Winnipeg

ONTARIO

It is interesting to note that the predicted population for Metropolitan Toronto in 1980 will be in excess of three million people. To meet this growth it is inevitable that our picturesque countryside will be transformed into large housing developments. To date, little inspiration may be realized from the existing communities. Real Estate tycoons and speculative builders have changed acres of land into a scrambled assortment of meaningless boxes. As long as the "quick turnover" dominates esthetics and the essentials of good planning, there is little hope for the betterment of such areas.

Our profession has shown a certain laxity to this movement. We should be morally obligated to raise the standard of housing our fellow men. We readily advise and control the environment for his place of education, business and entertainment, but can we truthfully acknowledge the same for his home? Those concerned with these communities should maintain a professional standard — stringent yet void of regimentation. The number of people participating matters little provided the goal is a common one.

Mass living is from the outset monotonous and demoralizing. If an area is properly planned and architecturally controlled (to the completion of the project) the benefit will be shared jointly by the original participants and the future dwellers.

There are several communities that deserve and rightly have received public recognition. The education and influence of these areas far outweighs the value of competitions for the "ideal home", the results of which in most cases are impractical, restricting and beyond the average man's income. Although the land developers are aware of the tremendous influence their neighbouring communities are creating, they are still forging ahead with the bulldozer quite ignorant of the results they should be achieving.

Let us do more than hope that the existing ills will be remedied in the future.

John H. Bonnick, Toronto

AAA ANNUAL MEETING

The Alberta Association of Architects has just recently concluded its Annual Assembly, which this year was held in Banff, Alberta at the Banff School of Fine Arts.

The Annual Assembly, which was well attended, elected the following officers of the Association for the year 1956: H. L. Bouey, President; W. G. Milne, 1st Vice-President; D. G. Forbes, 2nd Vice-President; J. B. Bell, Honorary Secretary; G. R. Ascher, Honorary Treasurer. Council Members at large: K. L. Bond, T. A. Groves, H. A. Henderson, J. McIntosh, K. C. Stanley.

The Assembly took place immediately following the conclusion of Session '56 which was by way of a Refresher Course for architects with Mr R. J. Neutra, well known American architect, as its Director and lecturer. Mr Neutra stayed to address the Alberta Architects' Association at their Annual Dinner. The subject of his address was "The Value of Session '56 to Architects both here and abroad."

REPORT ON SESSION '56

The New Year has started off with an architectural bang in Canada. *Session '56* at Banff, Alberta was a remarkable and resounding success and its reverberations ought to be heard around Canada and other parts of the world for a long time.

The Architectural Association of Alberta organized *Session '56* as "an exploration of architectural ideals and new contemporary approaches"; it was ably helped by its co-sponsor, the Department of Extension of the University of Alberta. For more than a week, thirty-five architects assembled in the Banff School of Fine Arts in the Canadian Rockies to participate in panel discussions on various aspects of architecture and its professional practices, and above all to hear Richard J. Neutra who acted as Director of the entire course.

Session '56 grew out of a profound dissatisfaction with the contemporary practice of architecture by two energetic and enthusiastic

Alberta architects: Howard L. Bouey and Kelly C. Stanley, respectively, Honorary Secretary and President of the Alberta Association. The preliminary program circulated throughout North America, stated that "*Session '56* is conceived on the premise that all architects are students and in the hope that it will develop into an annual assembly." Its sponsors were particularly concerned with the fact that "the practice of architecture under present day economic and technological influences, to any but the most dedicated, tends to produce an alienation within the architect from the ideals acquired during his academic years." It was meant to be a refresher course for practitioners as well as a meeting ground for a co-operative search and rediscovery for ideals of architectural design and greater opportunities for individual creativity.

The dominating personality undoubtedly was Neutra, who brought to *Session '56* more than thirty years of professional experience and a life-time of thought on the human problems of designing and building for people. The Session was scheduled for more than a week and closely organized around one topic per day. These subjects were introduced at length by Mr Neutra, and then taken up for discussion by a panel of four architects. In the late afternoon of each day, Mr Neutra summarized the discussion that had taken place. The topics ranged over a variety of subjects and panel participants were selected from among those who practise and those who teach architecture. In the discussion of the first topic, "Old Architecture and New Problems", Mr Neutra was supported by John Clayton and A. Minsos of the Alberta Association, and Professor Herman, University of Washington, and Professor Acland from University of British Columbia. The next day the panel consisted of three practitioners, Bill Leithead, Vancouver; Max Bates, Calgary; Joe Izumi, Regina; and the author, who developed the theme, "The Architect and Society". Then a welcome skiing and sightseeing week-end intervened to adjust ones point of view to mountains, sky and sun. On the following Monday: "The Architects' Means and Methods", after a brilliant introduction by Mr Neutra, was handled by three well-known architects: Bob Berwick from Vancouver, Ernie Smith from Winnipeg and Howard Bouey from Edmonton.

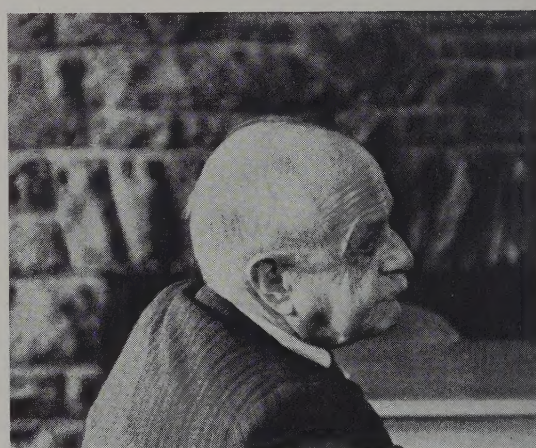
The following day Professor Eric Arthur of the University of Toronto and Professor Roy Sellors of Manitoba, shared the panel on "Architects' Training" with Kelly Stanley and Don Bittorf, both of Edmonton.

These panel discussions took up the bulk of the time and presented the framework for most of the stimulating discussion throughout *Session '56*. Undoubtedly, however, the highlights were the daily talks by Mr Neutra preceding the panel discussions and his two illustrated lectures on current problems in architecture, with reference to his own practice which ranges over the five continents. Those monumental lectures, as well as the marathon discussions during the week at Banff, revealed Mr Neutra as the outstanding humanist in architectural practice today, with a profound concern for the human problems in design and their satisfaction by the architect. Through a life-time of building, he attempted to elicit all conscious and many sub-conscious needs of the client as the basis for his design; apparently he has developed a remarkable skill in ferreting out information which to many practitioners remains locked up in their client's inability to express in words intimate human needs and profound aspiration. Mr Neutra's major concern, in order to understand his clients better and satisfy their needs fully in his buildings, is with the Physiology of Man. Throughout the Banff discussions, Mr Neutra argued that one of the great untapped resources of knowing more about people and their needs as a basis for architectural design lies in understanding and reckoning with their physiological responses to their environment. Mr Neutra emphasized that the concern of the practising architect was less with material things than with his ability to understand human beings fully, engage their co-operation to resolve their environmental needs and translate them into buildings. In innumerable examples he demonstrated the value of his physiological approach to design. Man to Mr Neutra is a complex interrelationship of psychological and physiological reactions to his environment, and unless these are consciously recognized and made the basis of design, the building will fail and not permit the client to lead a better and happier life in it. Even the most recalcitrant client seems to be able to understand an architect's solution to his building needs once they have been discussed in physiological terms; usually he begins to see the deeper and profoundly human satisfactions to be derived from the architect's solution.

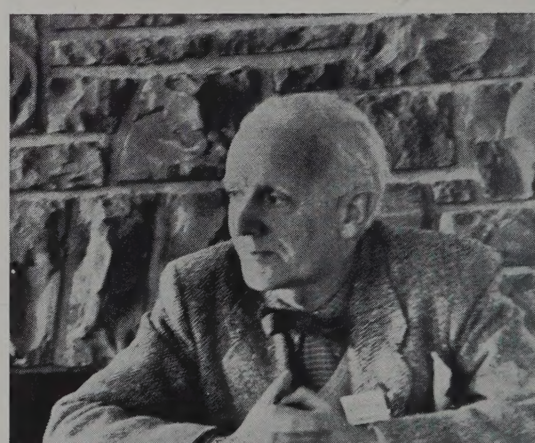
Throughout the discussions his recently published "Survival Through Design"[1] was referred to, and towards the end of the meeting Mr Neutra developed in some detail the chapter dealing with space and space relations, with great wit to the enjoyment of all. Perhaps the most provocative thoughts were contributed by Mr Neutra to the discussion on Architectural Education. He recognized two categories of architectural education: one, based on an idol teacher such as Mies van der Rohe at IIT, or until recently Walter Gropius at Harvard; the other, based on the broad teachings of a variety of architectural practitioners and thinkers such as Dean Wur-

[1]Neutra, Richard J: *Survival Through Design*, New York, Oxford University Press, 1954.

Mr and Mrs Richard Neutra



Professor Cecil S. Burgess



Professor Eric Arthur

ster developed at MIT, or now at California. To some extent the latter method is being followed by most of the Canadian Schools of Architecture. Here the student is exposed to a variety of points of view, sometimes even conflicting ones, and expected to use his own judgement in developing a personal architectural conviction. Mr Neutra contended that the second approach presenting the student with a multiplicity of architectural theories, tends to create uncertainty in the students and leads to confusion which hampers the learning process. He maintained that the confidence of the student in his teacher is essential, particularly under the fast changing technological conditions. Again, referring to the psychological and physiological basis of architectural practice, Mr Neutra suggested that a filial relation between student and teacher promotes this confidence and develops profound sympathy and admiration for teacher and teachings. In his own office he found that students with the rigid training under Mies at IIT fitted in more easily with his own practice than those trained under a broadly oriented curriculum. Apparently they had learned to accept a discipline and were able to subordinate their own personality to the process and progress of architectural work in an office; thereby they grew into and developed as a member of a team.

Extra curricula activities were many and varied; Mrs Dionne Neutra sang and accompanied herself handsomely on the piano, and later on the cello; her native Swiss folksongs, in particular were a delight. One evening Professor Acland amused all with enthusiastic comments and solemn asides on 'the New Mannerism in Architecture' (or was it the New Baroque?), assisted by magnificent slides of buildings ranging from Italy to Spain via Mexico to Japan. The author helped pass another evening with slides and discussion on recent progress of architecture and urban planning in Scandinavia and England.

The setting of *Session '56* undoubtedly contributed to its success. The contrapuntal scale of Mount Rundle to Mount Norquay, or Cascade Mountain to Tunnel Mountain, gave the discussions a heroic setting lending emphasis to Neutra's insistence upon the physiological basis for design. The sun was kind and provided fine weather for skiing and skating; tobogganing and curling amused others; in fact, the celtic fringe of the architectural profession staged a heated East-West contest with the Albertans posing as Eastern curlers. Fortunately, no broken bones, no wrenched knees, in fact hardly any crisis occurred, except perhaps being on time for breakfast or the early morning sessions after "a long night before".

An informal banquet, complete with a rousing skit, concluded the meeting. All the proceedings were tape recorded (including, one is told, the skit, for future RAIC convention guidance) and will be published after some editing. It ought to be a valuable record of a very stimulating meeting where some Canadian architects and teachers were able to spend a memorable week in the presence of a great man, exploring the frontiers of architectural practice and its education. It is hoped that this will have been the first of an annual event and that *Session '57* will continue this new and lively Canadian tradition.

H. Peter Oberlander

AIBC ANNUAL MEETING

The Architectural Institute of British Columbia Annual Meeting was held recently and the following report has been received:

John Lovatt Davies was elected President for the second consecutive year and Clive D. Campbell was elected Vice-President. Council Members for 1956 are Keith B. Davison, Fred Lasserre (government representative on the Council), Murray S. Polson, C. E. Pratt, Robert S. Siddall.

A key feature of the conference was a seminar on "What's next in Home Design?". Warnett Kennedy was moderator.

Among the resolutions approved in business sessions were:

That the AIBC request University of British Columbia officials to erect a building on the university campus to house the School of Architecture;

That the Institute Council explore with the BC Association of Professional Engineers the possibility of establishing a joint board of ethics and take action to set up such a board;

That the AIBC annual meeting be conducted in future for a minimum of two full days; and

That in the case of a temporary BC license being granted to architects elsewhere, that the amount of fees and collaboration with local architects be recommended by the AIBC Council on an individual basis and that this entire matter of collaboration by local architects be taken under consideration by the RAIC Council.

RAIC President A. J. C. Paine in a wire to the Annual Meeting, expressed regret at being unable to attend, but hoped he would meet most BC architects at the RAIC Annual Meeting at Banff in June, 1956.

CANADIAN GOVERNMENT OVERSEAS AWARDS

The Royal Society of Canada administers awards in the Arts, Letters and Sciences. Fellowships of $4,000 and Scholarships of $2,000 are available, tenable in France and the Netherlands, for students with MA or equivalent proceeding to a higher degree. Application forms and full information may be obtained from the Awards Committee, The Royal Society of Canada, National Research Building, Ottawa 2, Ontario. Applications must be received in Ottawa not later than April 1st, 1956.

NOTICE OF PARTNERSHIP

Murray D. Rhynas has entered into partnership with Earle L. Sheppard. The firm will practise under the style of Earle L. Sheppard & Rhynas, Architects, at 25 Adelaide West, Toronto, Ontario.

SEASONAL UNEMPLOYMENT UNDER ATTACK

A fresh and determined attack is being made on an old Canadian problem—seasonal unemployment. Government at all levels, labour, industry and individuals have banded together for this attack, which already shows signs of developing into a steady advance.

Seasonal unemployment represents a terrific loss each year. It has been estimated that in past years there have been more than 250,000 workers seasonally unemployed each winter in Canada, representing an annual loss in wages and purchasing power of some 150 million dollars. In recent years the amount of unemployment insurance paid out in the five winter months has been close to 100 million dollars each year. It is in the interests of everyone to reduce this serious drain on the prosperity and purchasing power of the nation.

It is realized that our climate will always slow down or stop entirely some activities but we must not let that realization prevent us from doing everything we can about others wherever possible. The industry which puts more people on the unemployed list each winter in Canada than any other is construction. Last winter, when unemployment was at its worst, 165,000, or nearly one-third of all male applications for employment on hand at National Employment Service offices, were made by skilled and unskilled construction workers. In August the proportion was only one-sixth.

The Federal Government has been giving intensive consideration to seasonal unemployment for some years. A critical examination of the nature and extent of the problem was first made, followed by a study of practical steps which might be taken to cope with it on all levels of government, by industries, employers, architects, unions and the general public. All the national organizations which could be of assistance co-operated in this study. As one result of the study a directive was recently issued to all federal departments and agencies instructing them to arrange government spending programs in such a way that the maximum amount of employment will be created in the winter months. The portions of the directive which apply to construction work are quoted below:

Buildings and Other Public Projects

Government departments and agencies are to arrange their construction programs so that plans and specifications, tender calls, contract awards, and the various stages of actual construction will be timed to provide the maximum amount of winter work for the construction trades.

The implementation of this objective will require careful attention to the development of plans, scheduling of work and provision of adequate engineering, drafting, architectural and related services, both in originating departments and agencies and in those responsible for the actual construction activities.

As a general practice, departments and agencies, when issuing tender calls for buildings and other projects on which work is to be carried on during the winter months, are to indicate the period of time within which the work is to be completed following the date the contract is awarded, that winter work is to be performed, and that the successful tenderer will be required to submit a satisfactory work schedule. Moreover, contracts which apply to projects involving winter work are to contain a provision requiring that winter work be undertaken continuously when in the opinion

of the department or agency awarding the contract such work is feasible and can be carried out in accordance with the conditions of the ontract.

Alterations, Repairs and Maintenance

Alterations and repairs on buildings, houses and equipment owned by government agencies will be planned so as to be carried out as far as practicable during the winter months. Certain types of repairs and alterations required on short notice may need to be done at other seasons but most work in these categories is to be planned so that it can be undertaken during the four winter months, December to March inclusive. Similarly, maintenance programs should be concentrated during the winter months, except in cases of urgency and where the work, by its nature, must be done at other times of the year.

Provincial governments are taking a keener interest in winter employment and some of them, as architects are well aware, have developed concrete plans for providing more winter work. Municipal governments are showing an awareness of the problem. The recent annual meeting of the Union of Nova Scotia Municipalities was addressed by the Minister of Public Works on winter employment. A discussion on the same subject will be held at the forthcoming annual meeting of the Union of New Brunswick Municipalities. The Canadian Federation of Mayors and Municipalities proposes to publish in its magazine some articles stressing the necessity of providing more winter work.

Quite recently, the Royal Architectural Institute of Canada was represented by Mr C. J. G. Carroll at a meeting of representatives of all the national organizations closely concerned with construction work. That group decided to establish an advisory council of the construction industry on winter employment. Mr Raymond Brunet, a past president of the Canadian Construction Association, has accepted the chairmanship. All concerned will be kept informed of the future activities of this group.

The Federal Government has no intention of relaxing its efforts now that a good start has been made. The necessity of providing more winter jobs will be kept prominently before the public. The Minister of Labour has written about this to all employers with fifty or more employees and to service clubs and women's organizations. He is arranging radio broadcasts by stations from coast to coast and having printed for wide distribution, bulletins which urge people to have as much as possible of their construction and other work done during the winter. The National Research Council will soon issue a pamphlet dealing with winter building. In addition, there are one hundred and fifty-four local advisory committees sponsored by the National Employment Service which are working hard in their communities to promote winter employment. They are receiving a great deal of assistance, co-operation and publicity at the local level.

Architects reading this may by now be wondering what remains for them to do when so much is being done already. The answer is that too much can never be done. There is a feeling on the part of many people that buildings constructed in winter are not as good as those constructed in summer. We all know that much construction work can be done effectively and economically in winter and that all operations, with the exception of back-filling of soil and exterior painting, can be carried on in winter if properly planned and necessary precautions have been taken. The architect is in a position to educate the public away from the traditional idea that buildings must always be started in the spring. Something has been accomplished in recent years due to the necessity of handling the tremendous volume of governmental, commercial and residential construction, but much remains to be done. It is recommended that architects seize every opportunity of influencing people to arrange their jobs so as to provide more winter work whenever this can be done without affecting adversely the interests of their clients.

CONTRIBUTOR TO THIS ISSUE

Irving Grossman was born in Toronto in 1926. He graduated University of Toronto in 1950 as a Pilkington Scholar. Worked in London, England for three years with Maxwell Fry and Jane Drew, and in the Housing Division of the London County Council. Travelled during this time throughout Europe and the Near East.

Mr Grossman started private practice in Toronto in 1953. Instructor in design at the University of Toronto in 1954, and at the present time.

COVER

The cover was designed by Mr Paul Arthur, Assistant Editor of *Graphis*, Zurich, Switzerland.

BOOK REVIEW

RIDEAU WATERWAY by R. F. Legget. Published by the University of Toronto Press. Price $5.00.

Many years ago, I decided to write a book about the Rideau Canal. It is, therefore, with mixed feelings that I see that Robert Legget has beaten me to the tape. He is to be congratulated on doing a fine, thorough piece of work. A tremendous amount of research has gone into the book; the bibliography is excellent and even the photographs are by the author. Perhaps the very thoroughness of the research takes away a little from the Rideau as a great and moving story of pioneer development, but that may be a captious criticism. The definitive work on the Rideau Canal has been written, and I shall value my copy.

Eric Arthur

O CANADA

Low tide